DOCUMENT 090

ADDENDA

ADDENDUM NUMBER 5

DATE: [3/12/2026]

PROJECT: **Ke-nek Water Treatment Plant and Water Main**

PROJECT NUMBER: **CA 21-F05**

OWNER: **Yurok Tribe**

ENGINEER: Maxwell Moore

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated 12/16/2025, Addendum Number 1 issued 12/16/2025, Addendum Number 2 issued 1/26/2026, Addendum Number 3 issued 2/9/2026, and Addendum Number 5 issued 3/3/2026 with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of 7 pages, a revised 68-page plan set (fully reattached), 53 pages of electrical specifications noted below and 59 pages of revised Documents, and a reattached project manual.

New Materials

Drawing No.	Drawing Title	Issue Date
E100	Symbols and Abbreviations	[3/12/2026]
E101	Electrical Notes	[3/12/2026]
E102	Single Line diagram and Load Summary	[3/12/2026]
E103	SES, ATS, Distribution Panel Elevation	[3/12/2026]
E104	Enlarged Electrical Site Plan	[3/12/2026]
E105	Treatment Plant Electrical Site Plan	[3/12/2026]
E106	Sand Filter Building Electrical Site Plan	[3/12/2026]
E107	Panel Schedules	[3/12/2026]
E108	Conduit and Cable Schedule	[3/12/2026]
E500	Electrical Details	[3/12/2026]

Document	Document Title	Issue Date
26 01 00	General Electrical Requirements	[3/12/2026]
26 01 26	Maintenance Testing of Electrical Systems	[3/12/2026]
26 05 23	Instrumentation and Communication Cables	[3/12/2026]
26 05 29	Supports for Electrical Systems	[3/12/2026]
26 05 33	Conduit and Boxes for Electrical Systems	[3/12/2026]
26 05 53	Identification for Electrical Systems	[3/12/2026]
26 05 83	Terminal Blocks	[3/12/2026]
26 09 16	Electrical Controls, Relays, and Alarms	[3/12/2026]
26 28 22	Low Voltage Circuit Breakers	[3/12/2026]
26 32 43	Battery Energy Storage System	[3/12/2026]
26 36 23	Automatic Transfer Switch	[3/12/2026]

Revised Materials

Drawing No.	Drawing Title	Issue Date
G101	Title Sheet	[3/12/2026]
C102	Plan View, Upper Access Road	[3/12/2026]
C104	Plan & Profile, Access Road	[3/12/2026]
C105	Plan & Profile, Access Road	[3/12/2026]
C203	Plan & Profile, Tulley Creek Rd	[3/12/2026]
C301	Enlarged Site Plan, Treatment Facility	[3/12/2026]
C302	Enlarged Site Plan, 100,000 Gallon Tank	[3/12/2026]
C303	Enlarged Site Plan, Tulley Creek Rd	[3/12/2026]
C304	Enlarged Site Plan, Tulley Creek Rd	[3/12/2026]
C305	Enlarged Site Plan, Treatment Improvements	[3/12/2026]
C404	Roughing Filter Detail	[3/12/2026]
C502	Civil Details	[3/12/2026]
C504	Civil Details	[3/12/2026]
C601	Grading Plan, Treatment Facility	[3/12/2026]
C605	Grading Details	[3/12/2026]
A105	Piping Details, Treatment Building	[3/12/2026]
A106	Electric Plan, Treatment Building	[3/12/2026]
A201	Plan View, Sand Filter Building	[3/12/2026]
A202	Roof Plan, Section, Sand Filter Bldg	[3/12/2026]
A210	Electric Plan, Sand Filter Building	[3/12/2026]

Document	Document Title	Issue Date
010	Request for Bids	[3/12/2026]
040	Bid Form	[3/12/2026]
01 11 90	Revisions to Standard Specifications	[3/12/2026]
01 27 00	Measurement and Payment	[3/12/2026]
22 11 00	Facility Water Distribution	[3/12/2026]
44 10 15	Water Quality Monitoring and Control System	[3/12/2026]

Answers to Questions Received

Revision to a previous answer – from coordination with PG&E, there is conduit intended to be installed without cable, and is deliberately noted in plan set and bid sheet as such.

1. Soffit Panels. The plans do not call anything out, but the specs discuss a material and pattern type for soffit panels if required. Should we include soffit panels in our pricing?

    - Yes, please include soffit panels in pricing for Metal Sand Filter Building and Chemical Treatment Building.

2. Insulation. None shown for the building on the plans. Should the building be insulated? If yes, please provide required R value and type preferred.

    - Insulation is not expected

3. Building Columns. Plan sheet A201 shows 7 column lines for the building in the north south direction. This is a lot for a building that is only 64' long. We could likely cut this down to 3 or 4 column lines. Is this acceptable or are we to bid the 7 column lines per plan?

    - A reduced column count is acceptable with a provided and approved metal building submittal.

4. The plans call out aluminum seamless gutter, but the spec indicate galvanized steel gutter and RWLs as part of the metal building package. Which type of gutter should we bid?

    - Please bid for aluminum seamless gutter.

5. "Division 09 includes systems for alkyd floor paint, intumescent coatings, wall coverings, CMU coatings, and ferrous metal systems. However, the drawings do not appear to identify specific locations where these finishes are required.
   Based on the plans, we currently see the following potential scope in Building 1: (CHLORINE/TREATMENT BUILDING)

    Interior gypsum board walls and ceilings (A101/A103)
    Metal doors and frames
    Exterior fascia and wood soffit
    Possible limited exposed structural steel & louvers

    - Painting scope should also include a coating for the metal pipes within this building, if not provided by pipe supplier. The rest of the assessment of painting scope is accurate for the Treatment Building when including the exposed structural steel and louvers.

6. For Building 2 (SAND FILTER/METAL BUILDING), we do not currently see defined paint callouts other than potential exposed structural steel. There are no finish schedules or finish tags identifying painted surfaces.

- The exposed structural steel of the building, doors, and louvers are expected to be painted in accordance with 09 90 00 and 13 24 19

7. Additionally, please clarify:
   Are exposed process pipes intended to be painted? If so, please confirm the material type and coating system.

   - Metal Pipe within the chemical treatment building is expected to be coated. Please confirm an exterior asphaltic coating of 1-mil.

8. Are concrete floors to receive alkyd or epoxy coating?

   - No

9. At this time, we are carrying painting only for visibly indicated drywall and miscellaneous metal surfaces per drawings, excluding intumescent, floor coatings, wall coverings, and pipe coatings unless otherwise directed."

   - Exposed ductile iron piping will have an asphaltic coat. Otherwise, accurate.

CHANGES TO THE PROJECT MANUAL

DOCUMENT 010 – REQUEST FOR BIDS

The bid close date has been revised to 2pm, Thursday, March 26th, 2026

DOCUMENT 040 – BID FORM

ADDED LINE ITEMS

Line item 72 3” Conduit, No Cable
Line item 73 4” Conduit, No Cable
Line item 74 5” Conduit, No Cable

These line items are added as a response to coordination with PG&E, for conduit to be installed with PG&E inspection, for future PG&E use. These conduits are intended to be installed without cable.

Line Item 75 Tank Site, Conduit and Cable

The conduit and cabling not captured within other items is to be priced in this item. This is the conduit and cable in the planset that is *not* installed for future utility and is *not* associated with line ‘F’. Empty conduit installs for future utility use are to be priced in the above 3 items, and conduit and cable associated with line ‘F’ is to be priced into line item 14.

Line Item 76 Utility Pad and Bollards

This line item is to install a pad with bollards to PG&E specification, for future PG&E use to install a transformer upon.

REMOVED LINE ITEMS

Line item 13 4" Conduit and Cable

After coordination with PG&E and having the controls of the system more defined, this line item is no longer needed.

MODIFIED LINE ITEMS

Line item 14 "2-inch Conduit and Cable"

Quantity has been revised to 4150 linear feet. This is now intended to only reflect the conduit and cable that accompanies line 'F1' 'F2' and 'F3'.

Line item 67 "Grid-charged battery backup system"

Section reference has been revised to Section 26 32 43 "Battery Energy Storage System"

Line item 69 "Stormwater Pollution Prevention Plan and EPA CGP"

Quantity has been changed to Lump Sum

Line item 70 "3-6-inch Rip Rap"

Unit has been revised to cubic yard, and quantity revised to 1.5 (cubic yards).

<u>01 27 00 MEASUREMENT AND PAYMENT</u>

Entries for the new line items (72-76) noted above have been added.

A cleanout has been added to the description of the retaining wall payment item.

<u>01 11 90 REVISIONS TO STANDARD SPECIFICATIONS</u>

Edits to Metal Building Specification

Edits to provide for 4/12 slope roofing, to match previously given guidance

Edits to rolling door specification

Removed use of 'sectional' door and replaced with 'rolling' door.
Presented Cookson Model changed to ESD10 – to match size requested

Edits to skylight specification

Integral skylights are now approved (No longer just curb-mounted)

Edits to chemical pump

Added Stenner pump controller and specified model

22 11 00 FACILITY WATER DISTRIBUTION

Roughing Filter entry revised to reflect Xylem as the current manufacturer.

44 10 15 WATER QUALITY MONITORING AND CONTROL SYSTEM

Edits to specified monitoring equipment

Chlorine and pH meter are now specified as a combined item, as offered by HACH
"CLF10SC and pHD Differential Sensor"

Turbidimeter changed to HACH TU5300sc

Module Channel Controller changed to HACH SC4500

CHANGES TO THE DRAWINGS

Please refer to the new electrical sheets for more specifics regarding conduit and electrical changes.

C102 – Generator and Propane Tank removal
Electrical Transformer added to site

C104 – Power Conduit for Utility through middle of road
2" PVC corrected to HDPE, and moved to side of road

C105 – Approximate location for utility transformer proposed through other ongoing work provided
This is the revised point for utility connection.

C301 - Conduit and Cable plan through site revised. Please see E107 for schedule.
A transformer (by utility) is added, with contractor-furnished pad, bollards, and conduit connections.
Drain lines from metal building revised.

C302 - Conduits and Electrical Pull Box for Utility shown
Road profile altered – water to be on road shoulder for utility conduit through roadway.

C303 - No new casing is required – modified plans only require usage of the 4 casings installed by previous work. Passing through this point is
2" water
4" water
6" water
2" conduit and communication cable
Utility connection point moved to sheet C302

C305 - Water service line to 1", corrected from 1.5"

C502 – Dual conduit trench is no longer used
Road profile revised for line F1 to be in shoulder and utility conduit in roadway.

C504 – Note 2 revised and Note 5 added. Tulley Creek Road will require 24" of clearance from stormwater infrastructure.

C601 – Propane tank and generator removed.
Rip rap added to gabion wall. Quantity added to asphalt rip rap.

C605 – Transformer Pad Detail added, 4/C605
Generator Pad and Propane Tank Pad removed

A105 - Flow switch removed
2 of 3 Turbidimeters removed. With change in specified HACH controller, only 1 turbidimeter is able to be live read at a time.

A106 – Detail 3/A106 revised and renamed. Load center revised. Meter moved to metal building.
Pump controller specified changed, no longer integrated to outlet itself.

A201 – 3" Drain revised to schedule 80 from C900.

A202 – 4/12 pitch now shown. 6/12 pitch still acceptable.
Callout for solar panel spacing removed (leftover from design-phase, solar is not part of project).

A210 - Redundant with new electrical sheets, removed.

END OF DOCUMENT

DOCUMENT 010 REQUEST FOR BIDS

YUROK TRIBE PLANNING AND COMMUNITY DEVELOPMENT

CA 21-F05 Yurok Ke-nek Water Treatment Plant and Water Main

I. INTRODUCTION

The Yurok Tribe Planning and Community Development Department is circulating this Request for Bids to solicit **Construction Bids** for **CA 21-F05 Yurok Ke-nek Water Treatment Plant and Water Main.** Bidder must have a current California Contractors License appropriate for the nature of work to be performed. Bidders (Licensed and Bonded in accordance with current California State Contractor's Law) shall have a Class A License. Any Contractor claiming Indian Preference shall complete and submit, with the bid, the form entitled "Application for Contractor/Business Certification" (included in the bidding package).

Federal Davis Bacon Wage Rates shall apply to CA IHS Project 21-F05. The Contractor can locate the current wage rates at the following web address: (https://www.wdol.gov/dba.aspx). The Contractor can locate the current version of the Department of Labor's WH-347 form and instructions for its completion at the following web address: (https://www.dol.gov/whd/forms/wh347instr.htm).

The Water Treatment Plant will be constructed in the community of Ke-nek on Tulley Creek Road (41.2198 N, 123.7729 W) in Humboldt County, California. All work must be completed in a manner compliant with all applicable Federal laws, State laws, Tribal laws and County building codes.

The range of bids for this work is estimated to be between **$3,500,000 and $5,500,000**

Contract time is **300 days** as specified in the Bid form.

II. PROJECT PROFILE

The Yurok Tribe has been awarded funding from the US Environmental Protection Agency through a Drinking Water Tribal Set Aside grant. The funding will be used by the Yurok Tribe to install 8,500 LF of water mains, 750 LF of water service lines, and approximately 2,000 LF of transmission main. Flow meters, hydrants, and assorted valving installation will accompany these water lines. In addition, a 60,000-gallon bolted steel water tank, a roughing filter, a slow sand filter building, a chemical treatment and monitoring building, and backup generator power for these facilities will be constructed.

A non-mandatory pre-bid meeting and walk through will be offered to all bidders, meeting outside of the Yurok Tribe Tulley Creek Fire Station, located at [41.220153°, -123.772560°], at **11am on Thursday, January 29th, 2026**.

III. AREA PROFILE

The site location for the contract is on Tulley Creek Road, serving the community buildings, the recent Alvarez development, and the McCoy community, located within Humboldt County, in Northwestern California. The site is a rural area with nearby electricity. The surface water system in place currently intakes water from both Owl Creek by impoundment and Tulley Creek by infiltration gallery. There is currently a

water treatment system and tank serving the McCoy community, and another water tank that serves the offices, fire department, and other community buildings with untreated water.

IV. SCOPE OF WORK

It is the intent of the Yurok Tribe to hire a licensed contractor, in good standing, who possesses a valid California General Contractor's License (Class A) to manage and construct the project.

i. Standard and Guidelines

a. California Building Code (CBC), latest edition
b. Humboldt County Building Codes, latest edition
c. American Water Works Association Standards, latest edition
d. National Electric Code, latest edition
e. Uniform Plumbing Code (UPC), latest edition
f. State of California Energy Codes, latest edition
g. Federal Americans with Disabilities Act of 1990, Accessibility Guidelines for Building and Facilities (ADA) with multi-use functions.
h. National Fire Code (NFC), latest edition
i. Uniform Mechanical Code (UMC), latest edition
j. National Sanitation Foundation, latest edition
k. California Department of Water Well Standards, latest edition
l. US Environmental Protection Agency Water Well Standards, latest edition
m. State Water Resources Control Board Underground Storage Tank Regulations, Title 23, California Code of Regulations, Chapter 16, latest edition
n. Yurok Tribe Tribal Employment Rights Ordinance (TERO)
o. Yurok Tribe Water Quality Certification
p. Other applicable building codes and regulations

ii. Construction Phase

a. The Contractor shall obtain the following permits:
    a) Yurok Tribe TERO permit – Justin Woods – 707-457-7637
    b) Yurok Tribe Environmental Program water quality control permit – Joshua Cahill – 707-954-7519
b. The Contractor will be responsible for complying with the Yurok Tribe Cultural Resources Management Permits and potential onsite monitoring requirements.
c. The Contractor will be responsible for attending a Preconstruction Meeting with the Yurok Tribe, the Engineer, and any Sub-Contractor as the Contractor deems necessary. At the preconstruction meeting, the Contractor will be responsible for presenting all construction time tables, schedules and approval processes. The meeting shall also cover the project's method of communication, conflict resolution and discussion of the project's major obstacles or potential problems. All consultants, contractors and subcontractors shall be apprised of the Tribes TERO Ordinance and the TERO permitting process.
d. The Contractor shall be responsible for preparation of a construction schedule and payment schedule for the entire project from start to finish.
e. The Contractor shall schedule at least one monthly meeting with the Indian Health Service, Yurok Tribe's authorized representatives and any subcontractors or vendors necessary to complete the project in a timely manner. Additional informal meetings may be called if necessary to gather input, provide clarification, and resolve issues that may arise during construction of the work.

f. The Contractor shall be responsible for the submission of Submittals to the Engineer for all materials used in the project.
g. The Contractor shall be responsible for preparing the meeting minutes for the monthly meetings.
h. Approved change orders must be submitted with monthly Request for Payments.

iii. BID REQUIRMENTS

a. The Bid shall include the name of the firm submitting the Bid, its mailing address/telephone number, Contractor license number, state, and type, and the name of the individual to contact if further information is desired.
b. The prospective contractor shall designate, by name, the project manager to be employed. The selected contractor shall not cause the substitution of the project manager without prior approval by the Yurok Tribe Planning and Community Development Department.
c. The prospective contractor shall provide names, addresses, and telephone numbers for at least three clients for whom the prospective contractor has performed work similar to that proposed in this request. A brief abstract shall be provided for the reference projects.
d. Provide a listing of all Native American projects and all similar construction projects within the past 2 years, including a list of references (with phone numbers and addresses) for each project.
e. Provide a plan for maximum utilization of American Indian Workers as required in the TERO permit. Include a Narrative of TERO compliance experience on previous projects.
f. If subcontractors are to be used, the prospective contractor must submit a description of each person or company, license number, and the work to be done by each subcontractor.
g. The prospective contractor shall describe the qualifications of all subcontractors to be used on the project.
h. The prospective contractor shall prepare a detailed budget (see Bid Schedule) for the work to be performed. The budget shall use line items to distinguish cost in the Schedule of Values.
i. The prospective contractor shall disclose any and all relationships with clients, entities, agencies, or individuals bearing interests within the scope of the project, or who may benefit in any manner from the products of the project.
j. The sealed Bid shall be transmitted with a cover letter that must be signed by an official authorized to bind the bidder contractually and shall contain a statement to the effect that the Bid is a firm offer for a 60-day period. The letter accompanying the technical Bid shall also provide the following: name, title, address, and telephone number of submitter.

V. BID REVIEW

Each Bid will be reviewed to determine if it meets the Bid packet requirements. Failure to meet the requirements for the Request for Bids may be cause for rejection of the Bid.

The Yurok Tribe Planning Department may reject any Bid if it is conditional, incomplete, or contains irregularities. The Yurok Tribe may waive an immaterial deviation in a Bid. Waiver of an immaterial deviation shall in no way modify the Request for Bids documents or excuse the bidder from full compliance with the contract requirements if the bidder is awarded the contract.

VI. INDIAN PREFERENCE

Indian preference in Contract Award and equal employment opportunities shall apply. All BIDDERS requesting Indian preference shall submit their request for Indian preference along with their Bid.

Qualified, responsible and responsive Indian bidders, who submit Bids that are within 5% of the lowest Bid, shall be given the opportunity to lower their Bid to below the lowest Bid amount and become the lowest bidder.

VII. BID EVALUATION CRITERIA

1. The award will be made to the lowest responsive, responsible BIDDER with due consideration for Indian Preference.
2. Bidder's qualification will be evaluated to determine:
    a. The firm's qualification and reputation in general.
    b. Valid California Contractor's License in Good Standing
    c. Qualifications of staff.
    d. The firm's experience in the type of work that the project requires.
    e. Related experience of the proposed project manager and project team.
    f. Past performance on related assignments.
    g. Information obtained from references.
    h. Other investigations, as deemed necessary, to determine the ability of the BIDDER to perform the work.
3. Indian Preference for the bidders who submit the required verification with their BID.

IIX. CONTRACT AWARD

A contract will be negotiated with the lowest responsive, responsible BIDDER with due consideration for Indian Preference. The Yurok Tribe Planning Department will award a contract at the Yurok Tribe office in Klamath, CA.

If a contract cannot be negotiated with the firm submitting the lowest responsive, responsible Bid, then staff shall commence negotiation with the firm submitting the second most responsive, responsible BID.

IX. BID SUBMITTALS AND CONDITIONS

Bids will be received by the Yurok Tribe, at the Yurok Tribal Office located at 190 Klamath Blvd., Klamath, CA, until **2:00 P.M. on Thursday, March 26th, 2026,** and then at said office opened publically immediately after time for receipt of Bids. The Owner will make the Bids public, and the Owner may provide a summary of the total Bid amounts after an Agreement has been executed with an acceptable bidder.

The following documents constitute a complete Bid and are required to be submitted to form a responsive Bid:

a) Cover Letter – Refer to Section IV (iii)(j) of this document
b) Bid Form
c) List of Subcontractors
d) Contractor's Questionnaire
e) Non-Collusive Affidavit
f) Application for Contractor/Business Certification (If Claimed)
g) Bid Bonds (in the amount sum no less than five (5%) percent of Bid Price.

Each BID must be submitted in a sealed envelope, addressed to Mike Seracy, Planner, Yurok Tribe, P.O. Box 1027 (mailing address), 190 Klamath Blvd (physical address)., Klamath, CA 95548. Bids must be received by **2:00 P.M. on Thursday, March 26th, 2026**. The sealed envelope containing the BID must be

plainly marked on the outside as BID for the **21-F05 Ke-nek Water Treatment Plant and Water Main**, and the envelope should also bear on the outside the name of the BIDDER, their address and license number.

The sealed envelope containing the BID together with the remaining required documents must be enclosed in another envelope addressed to Mike Searcy, Planner, Yurok Tribe at PO Box 1027 (mailing address), 190 Klamath Blvd (physical address)., Klamath, CA 95548.

Bids received prior to the time of opening will be securely kept, unopened. The official who is to open the Bids will decide when the specified time has arrived, and no Bid received thereafter will be considered. No responsibility will attach to office personnel for the premature opening of a Bid not properly addressed and identified. Telegraphic Bids or modifications will not be considered.

Any BIDS may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. A conditional or unqualified BID will not be accepted.

BIDDERS shall have a current California Contractors License appropriate for the nature of work to be performed. Bonafide BIDDERS (Licensed and Bonded in accordance with current California State Contractor's Law) shall have a License Class A.

Federal Davis Bacon Wage Rates shall apply to CA IHS Project 21-F05. The Contractor can locate the current wage rates at the following web address: (https://www.wdol.gov/dba.aspx). The Contractor can locate the current version of the Department of Labor's WH-347 form and instructions for its completion at the following web address: (https://www.dol.gov/whd/forms/wh347instr.htm).

Indian preference in Contract Award and equal employment opportunities shall apply. All BIDDERS requesting Indian Preference shall submit their request for Indian preference to the Yurok TERO Office for approval. A TERO tax of 5% of the total gross amount of the contract shall be applicable in accordance with the TERO provisions of the Yurok Tribe.

Contact Justin Woods, (707) 457-7637 for questions on the Yurok TERO policy.

LATE SUBMITTALS

Bids received after this specified time will not be considered and may be returned to bidder unopened.

MODIFICATION OR WITHDRAWALS OF BIDS

Any Bid received to the date and time specified above for receipt of Bids may be withdrawn or modified by written request of the bidder. To be considered, however the modified Bid must be received by the date and time specified above.

PROPERTY RIGHTS

Bids received within the prescribed deadline become the property of the Yurok Tribe Planning Department and all rights to the contents therein become those of the Yurok Tribe Planning Department.

AMENDMENTS TO REQUEST FOR BID

The Yurok Tribe Planning Department reserves the right to amend the Request for Bids by addendum prior to the final date of Bid submission.

FUNDING

Funding for this project is provided through the Indian Health Service grant program.

NON-COMMITMENT OF THE YUROK TRIBE PLANNING DEPARTMENT

This Request for Bid does not commit the Yurok Tribe to award a contract, to pay any costs incurred in the preparation of a Bid to this request, or to procure or contract for services or supplies. The Yurok Tribe reserves the right to accept or reject any or all Bids received as a result of this request, to negotiate with any qualified firm, or to modify or cancel in part or its entirety the Request for Bids if it is in the best interest of the Yurok Tribe to do so.

TERO

The Yurok Tribe's Tribal Employment Rights Ordinance (TERO) shall apply. A copy of the TERO Indian Preference Plan has been included in Division 0-Bidding Requirements of the Project Manual. Any questions regarding the TERO ordinance should be forwarded to the Yurok Tribe's TERO officer:

Justin Woods, TERO Officer
Yurok Tribe
P.O. Box 1027 (mailing address)
190 Klamath Blvd. (physical address)
Klamath, CA 95548
Phone # (707) 457-7637

QUESTIONS

Questions regarding this Request for Bid will be received by telephone or in writing. Written questions should include the individual's name, the name of the firm, address, and telephone number. The Yurok Tribe Planning Department website contains electronic copies of the Project Manual, Addenda, Plan Set and related documents (http://www.yuroktribe.org/departments/planning/RequestforProposal.htm).

Project questions shall be directed to:

Mike Searcy, Planner
Yurok Tribe Planning Department
PO Box 1027 (mailing address)
190 Klamath Boulevard (physical address)
Klamath, CA 95548
Phone # (707) 382-1457
misearcy@yuroktribe.nsn.us

Technical questions shall be forwarded to the Engineer no less than seven (7) days before date set for receipt of Bids. Replies will be made by Addenda. Technical questions shall be directed to:

Maxwell Moore, EiT, Environmental Engineer
Indian Health Service
1125 16th Street Suite 100
Arcata, CA 95521
Phone # (707) 822-1688
max.moore@ihs.gov

DOCUMENT 040 BID FORM

To: Yurok Tribe

Project: CA 21-F05 Yurok Ke-nek Water Treatment Plant and Water Main

Bid of _____ (Company Name)

(hereinafter called "BIDDER"), organized and existing under the laws of the State of California, doing business as _____ (a corporation, a partnership, an individual, etc.) to the Yurok Tribe (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the completion of **CA 21-F05 - Yurok Ke-nek Water Treatment Plant and Water Main**.

The Yurok Tribe has been awarded funding from the US Environmental Protection Agency through a Drinking Water Tribal Set Aside grant. The funding will be used by the Yurok Tribe to install 8,500 LF of water mains, 750 LF of water service lines, and approximately 2000 LF of transmission main. Flow meters, hydrants, and assorted valving installation will accompany these water lines. In addition, a 60,000-gallon bolted steel water tank, a roughing filter, a slow sand filter building, a chemical treatment and monitoring building, and backup generator power for these facilities will be constructed.

All work shall be completed in strict accordance with the Contract Documents, within the time set forth therein, and at the prices stated in the BID SCHEDULE.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party hereto certifies as to his organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE to PROCEED and to fully complete the PROJECT within three-hundred (300) consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of $150.00 for each consecutive calendar day thereafter as provided in Section 34, Liquidated Damages, of the General Conditions.

BIDDER acknowledges of receipt of the following ADDENDUM(s):

NUMBER DATE

#1:_____

_____

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the unit prices or lump sum stated in the Bid Schedule. Bids are considered valid for 60 days from Bid closing date.

BID SCHEDULE

PROJECT DESCRIPTION

The following is a construction contract for completion of the specified work in the contract documents.

ITEM	ITEM DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	Mobilization / Demobilization (NTE 10% of Total Bid) *Section 01 27 00*	LS	1		
2	Hot Mix Asphalt *Section 02 30 00*	CY	2215		
3	Concrete *Section 03 30 00*	CY	169		
4	Wood Frame Building - Water Treatment Building *Section 06 10 00*	LS	1		
5	Metal Frame Building - Sand Filter Building *Section 13 34 19*	LS	1		
6	5000 Gallon Poly Tank *Section 22 11 00*	LS	1		
7	Roughing Filter *Section 22 11 00*	LS	1		
8	Booster Pump *Section 22 11 00*	EA	2		
9	Unistrut - 1-5/8" *Section 22 11 00*	LF	85		
10	Magnetic Flow Meter (No Box) *Section 01 11 90 / 22 11 00*	EA	1		
11	Magnetic Flow Meter and Box *Section 01 11 90 / 22 11 00*	EA	1		
12	Pressure Gauge *Section 01 11 90 / 22 11 00*	EA	2		
13	~~4" Conduit and Cable~~ ~~*Section 26 05 33*~~	LF	0		
14	2" Conduit and Cable *Section 26 05 33*	LF	4150		
15	~~18kW Propane Generator~~ ~~*Section 01 11 90 / 26 32 13*~~	EA	0		
16	~~Automatic Transfer Switch~~ ~~*Section 01 11 90 / 26 32 13*~~	EA	0		
17	Retaining Wall *Section 31 22 13*	LS	1		

18	Excavation and Grading *Section 31 22 13*	LS	1		
19	Cultural Monitoring *Section 31 23 17*	LS	1		
20	4' Manhole Drain Inlet *Section 31 25 13*	LS	1		
21	Drain Dissipater *Section 01 11 90 / 31 37 00*	EA	2		
22	Class 2 Aggregate Base *Section 32 11 23*	CY	533		
23	Class 3 Aggregate Base *Section 01 11 90 / 32 11 23*	CY	2		
24	Imported Fill *Section 01 11 90 / 32 11 23*	CY	975		
25	10" Drain Line - PVC C900 *Section 33 11 13*	LF	5		
26	10" Drain Line - CPP *Section 33 11 13*	LF	335		
27	6" Water Main - PVC C900 *Section 33 11 13*	LF	4340		
28	4" Water Main - PVC C900 *Section 33 11 13*	LF	3620		
29	3" Water Main - PVC SCH80 *Section 33 11 13*	LF	200		
30	2" Water Main - PVC SCH80 *Section 33 11 13*	LF	428		
31	1.5" Water Main - PVC SCH80 *Section 33 11 13*	LF	260		
32	3/4" Water Main - PVC SCH80 *Section 33 11 13*	LF	25		
33	6" Water Main - HDPE *Section 33 11 13*	LF	150		
34	4" Water Main - HDPE *Section 33 11 13*	LF	450		
35	4" Water Main - Ductile Iron Pipe *Section 33 11 13*	LF	45		
36	1" Water Service Line - PE Pipe *Section 33 11 13*	LF	740		
37	2" Transmission Main - PE Pipe *Section 33 11 13*	LF	1900		

38	Connection at Intake *Section 33 11 13*	LS	1		
39	Culvert Crossing *Section 33 11 13*	EA	7		
40	6" Gate Valve (No Box) *Section 33 11 16*	EA	1		
41	4" Gate Valve (No Box) *Section 33 11 16*	EA	2		
42	6" Gate Valve and Riser *Section 33 11 16*	EA	20		
43	4" Gate Valve and Riser *Section 33 11 16*	EA	14		
44	3" Gate Valve and Riser *Section 33 11 16*	EA	1		
45	2" Gate Valve and Riser *Section 33 11 16*	EA	1		
46	1" Gate Valve and Riser *Section 33 11 16*	EA	1		
47	6" Check Valve and Box *Section 33 11 16*	EA	1		
48	4" Check Valve and Box *Section 33 11 16*	EA	2		
49	3" Check Valve and Box *Section 33 11 16*	EA	1		
50	2" Check Valve and Box *Section 33 11 16*	EA	1		
51	2" PVC Check Valve (No Box) *Section 33 11 16*	EA	8		
52	Flush Hydrant *Section 33 11 16*	EA	1		
53	Altitude Valve and Box *Section 01 11 90 / 33 11 16*	LS	1		
54	Combination Air Valve *Section 33 11 16*	EA	4		
55	Air Release Valve *Section 33 11 16*	EA	1		
56	Float Valve *Section 01 11 90 / 33 11 16*	EA	1		
57	3" Pressure Reducing Valve and Box *Section 01 11 90 / 33 11 16*	EA	1		

58	6" Pressure Reducing Valve and Box *Section 01 11 90 / 33 11 16*	EA	1		
59	Residential Water Meter *Section 01 11 90 / 33 12 13*	EA	3		
60	Residential Water Connection *Section 33 12 13*	EA	4		
61	60,000 Gallon Bolted Steel Storage Tank *Section 33 16 20*	LS	1		
62	Slow Sand Filter Media *Section 33 19 00*	LS	1		
63	Slow Sand Filter Basins *Section 03 30 00*	LS	1		
64	Slow Sand Filter Vault *Section 03 30 00*	LS	1		
65	~~500-gallon Propane Tank and Foundation~~ ~~*Section 01 11 90 / 33 51 00*~~	LS	0		
66	Water Monitoring Equipment, Pipe, Tubing, and Controls *Section 44 10 15*	LS	1		
67	Grid-charged Battery Backup System *Section 26 32 43*	LS	1		
68	Vault for DWR Connection, 2/C304 *Section 33 05 17*	LS	1		
69	Stormwater Pollution Prevention Plan and EPA CGP *Section 31 25 13*	LS	1		
70	3-6" Rip Rap *Section 31 37 00*	CY	1.5		
71	Site Clearing *Section 31 37 00*	LS	1		
72	3" Conduit, No Cable *Section 26 05 33*	LF	80		
73	4" Conduit, No Cable *Section 26 05 33*	LF	1430		
74	5" Conduit, No Cable *Section 26 05 33*	LF	480		
75	Tank Site, Conduit and Cable *Section 26 05 33*	LS	1		

76	Utility Pad and Bollards *Section 31 00 00*	LS	1		
			SUBTOTAL:		
	TERO Fee [5.0% of Subtotal]	LS	1		
			Total of All Unit Price Bid Items		$

Respectfully Submitted:

_____	_____
Signature	Address
_____	_____
Title	Date
_____	_____
License No.	Expiration Date

SECTION 01 11 90

REVISIONS TO STANDARD SPECIFICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Revisions or amendments to standard specifications.
2. Changes to product requirements.
3. Changes to execution requirements.

B. Related Sections:
1. Section 03 10 00 – Concrete Forming and Accessories
2. Section 13 34 19 – Metal Building Systems
3. Section 26 05 19 – Electrical Conductors and Cables
4. Section 26 05 33 – Conduit and Boxes for Electrical Systems
5. Section 31 23 17 – Trenching
6. Section 33 05 17 – Precast Concrete Valve Vaults and Meter Boxes
7. Section 33 11 13 – Water Distribution Mains
8. Section 33 11 16 – Water Utility Distribution Valves and Hydrants
9. Section 33 12 13 – Water Service Connections
10. Section 33 16 20 – Bolted Steel Water Storage Tanks

1.2 **Section 13 34 19** – Metal Building Systems – REMOVE SECTION '1.3 SYSTEM DESCRIPTION' IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:

A. Single span rigid frame

B. Primary Framing: Rigid frame of rafter beams and columns, intermediate columns (where required), braced end frames, end wall columns, and wind bracing.

C. Secondary Framing: Purlins, girts, eave struts, sill supports, clips and other items detailed.

D. Wall System: Preformed metal panels of vertical profile, liner sheets, and accessory components.

E. Roof system: Preformed metal panels of upslope profile, liner sheets, and accessory components.

F. Roof Slope: 4 to 6 inches in 12 inches' slope.

1.3 **Section 26 05 33** – Conduit and Boxes for Electrical Systems – ADD THE FOLLOWING: TO '1.1 SUMMARY'

A. All work to be completed in accordance to the Electric Service Requirements Manual, Pacific Power. This document is available at www.pacificpower.net

PART 2 PRODUCTS

2.1 **Section 03 10 00** – Concrete Forming and Accessories – ADD SECTION '2.3 FASTENERS'

A. Wedge Type Expansion Anchor Bolt
1. Manufacturers: Red Head or approved equal
2. Description
    a. Stainless Steel
    b. Of size depicted on Drawings (SWW-3836)
        1) SWW-3836
        2) 3-3/4" Overall Length
        3) Fastens through up to 1-7/8" of material
        4) 3/8" anchor dia – 16 threads per inch, 2.5" Thread Length

2.2 **Section 08 13 14** – Standard Steel Doors – REPLACE THE FOLLOWING SECTION "2.1 STANDARD STEEL DOORS" WITH

A. Manufacturers:
1. Mesker Door Model N-Series
2. Trudoor – Hollow Metal Door with Louver
3. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description:
1. Metal Door – 18-Gauge Steel Face Sheets
2. 3068 or 3070 – as specified in Drawings
3. With 24" x 18" Louvered Vent where specified on plan set
4. For Exterior Applications
5. "Reverse" or "Outswing" Orientation (Opens towards exterior)
6. Insulated, SDI 108, 1-3/4" Thick
7. Level 2 – Heavy Duty, Model 1, Full Flush Design

2.3 **Section 08 71 00** – Door Hardware – ADD THE FOLLOWING TO SECTION "2.1 DOOR HARDWARE"

A. Manufacturers
1. Trudoor
2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Accessories
1. Accessories shall conform to 08 71 00 Door Hardware
2. Rim Exit Device and Locking Lever Handle
    a. Trudoor - TDE-2000R-KIL Rim Exit with Keyed Entry Level Rim
        1) Deadlocking Latchbolt, 5/8" projection
        2) Non-handed for interior side
        3) Locking lever doorknob for exterior side
        4) For 3' wide door
3. Door Closer
    a. Trudoor TDC-300 Grade-1 Door Closer
        1) ANSI 156.4 Grade 1 Standards

2) Adjustable Spring Power
3) Aluminum Finish

2.4 **Section 13 34 19** – Metal Building Systems – REPLACE SECTION '2.5 COMPONENTS – OVERHEAD DOORS' IN ITS ENTIRETY WITH THE FOLLOWING:

A. Overhead Doors:
1. Manufacturers:
a. Cookson Rolling Service Door, ESD10
b. DBCI 2000 Series, Light Roll Up
c. Substitutions Permitted: Section 01 60 00 - Product Requirements

2. Description:
a. Steel or aluminum overhead rolling door, manual operation, stock configuration and hardware
b. Outer steel sheet of minimum 0.058 inches thick, flat profile
c. 12' Wide, 10' Tall opening size
d. Color by Tribe direction

B. Overhead Door Frame
1. Formed steel sections braced to building frame

2.5 **Section 13 34 19** – Metal Building Systems – REPLACE SECTION '2.7 PLASTIC SKYLIGHTS' IN ITS ENTIRETY WITH THE FOLLOWING:

A. Polycarbonate Skylight
1. Manufacturers:
a. SunWeld Plus by Velux
b. Substitutions Permitted: Section 01 60 00 - Product Requirements
2. Description:
a. Size: as shown on plan set
b. Curb-mounted or integral to roofing system
c. Single Dome
d. Clear glazing
e. Polycarbonate Material

2.6 **Section 13 34 19** – Metal Building Systems – REPLACE SECTION '2.9 FABRICATION – WALL AND ROOF SYSTEMS' IN ITS ENTIRETY WITH THE FOLLOWING:

A. Siding: Minimum 26-gauge metal thickness, preformed ribbed steel profile, lapped edges fitted with continuous gaskets.

B. Roofing: Minimum 24-gauge metal thickness, ribbed profile, lapped or male/female edges fitted with continuous gaskets.
1. Roof Surfaces: ENERGY STAR compliant with minimum solar reflectance index (SRI) of 78 for 75 percent of roof area, calculated in accordance with ASTM E1980.
a. Reflectance: Measured in accordance with ASTM E903, ASTM E1918, or ASTM C1549.
b. Emittance: Measured in accordance with ASTM E408 or ASTM C1371.

C. Liner: Minimum 28-gauge metal thickness, V crimped profile, lapped V edges fitted with continuous gaskets.

D. Soffit Panels: Minimum 24-gauge metal thickness, V crimped profile, unperforated.

E. Girts/Purlins: Rolled formed structural shape to receive siding, roofing sheet.

F. Internal and External Corners: Same material thickness and finish as adjacent material, profile shop cut and factory mitered to required angles. Back brace mitered internal corners with 26-gauge thick sheet.

G. Flashings, Closure Pieces, Fascia, and Caps: Same material and finish as adjacent material, profile to suit system.

H. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive finish.

I. Ventilator: Sheet steel, galvanized, rotary continuous ridge design.

J. Roof Ridge Vent
   1. Manufacturer:
      a. LOMANCO – VUR-10 Aluminum Ridge Vent
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Type:
      a. Ridge ventilation system
      b. 10” Length
      c. Fits roof pitches 3/12 to 8/12
      d. With interlocking male/female connections
      e. With V-PLUG Accessories for exposed ends

K. Gable Vents
   1. Manufacturer:
      a. LOMANCO – A88B - Triangular Line Gable Vents
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Type:
      a. Color: Best match for wall, by Tribe direction
      b. All aluminum Louver
      c. Adjustable pitch – match to building roof pitch (6/12)

L. Wall Vents
   1. Manufacturer:
      a. McMaster-Carr – Fixed-Blade Wall Louver
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Type:
      a. For 12” x 12” Opening
      b. Overall 14.5” x 14.5”
      c. Aluminum Construction

2.7 **Section 13 34 19** – Metal Building Systems – REMOVE SECTION '2.10 FABRICATION – GUTTERS AND DOWNSPOUTS' AND REPLACE WITH:

A. Fabrication of gutters of downspouts shall be of aluminum

B. Form gutters and downspouts of profile and size to collect and remove water. Fabricate with connection pieces.

C. Form sections in maximum possible lengths. Hem exposed edges.

D. Fabricate support straps of same material and finish as roofing metal, color as selected.

E. Downspouts shall join into drainage pipe by drain box.

2.8 **Section 22 40 00** – Plumbing Fixtures – REPLACE SECTION '2.1 UTILITY SINKS' WITH

A. Sink
   1. Manufacturers:
      a. Global Industrial: Stainless Steel Utility Sink W/ Faucet
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Description
      a. 24" x 24" x 14" Deep, 1 Compartment Basin
      b. Metal Construction
      c. Two handle faucet
      d. Labeled with "Non-potable" – to be added by contractor

2.9 **Section 22 40 00** – Plumbing Fixtures – REPLACE SECTION "2.2 EMERGENCY COMBINATION SHOWER WITH EYE AND FACE WASH" WITH "RESERVOIR BASED EYE WASH STATION"

A. Reservoir-Based Eye Wash Station
   1. Manufacturer:
      a. Fendall Pure Flow 1000 Eyewash Station
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Description:
      a. Reservoir-based, Self-Contained, Eyewash Station
      b. Capable of delivering 0.4 GPM for 15 minutes
   3. Accessories
      a. Fendall Refill Cartridges (Set of 2)
      b. Fendall Universal Stand

2.10 **Section 26 32 13** – Engine Generators – REPLACE SECTION "2.2 GENERATOR" WITH

A. Generator
   1. Manufacturer:
      a. Generac Guardian Series
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Generator manufacturer shall have an authorized dealership within 125 miles of the installation location.

3. Product Description: DC Coupled Generator, to be used with Propane.
4. Rating: 10kW, nominal full load power generation
5. Enclosure: NEMA
    a. Doors to be keyed and lockable.

2.11 **Section 26 32 13** – Engine Generators – REPLACE SECTION "2.4 TRANSFER SWITCH" CONTENT WITH:

A. Automatic Transfer Switch
1. Manufacturers:
    a. Generac – PWRcell Automatic Transfer Switch
    b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description
    a. 200A Rated
    b. NEMA 3R Enclosure
    c. Service Entrance Rated
    d. Bi-Directional
    e. Automatic Bypass Switch

2.12 **Section 26 32 13** – Engine Generators – ADD SECTION "2.7 PROPANE TANK":

A. Propane Tank
1. Manufacturers:
    a. Kleen-Rite
    b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description
    a. Horizontal Cylinder shaped
    b. 500 Gallon Volume, to hold 400 gallons of propane at rated capacity
    c. Fitted with all valves and connections required for standard operation, all rated to handle 250 p.s.i.g.
    d. NFPA 58

2.13 **Section 26 51 00** – Interior Lighting – REPLACE SECTION 2.1 IN ITS ENTIRETY AND REPLACE WITH '2.1 LUMINAIRES:

A. Interior Lighting
1. T8 Interior Light
    a. Manufacturers:
        1) McMaster-Carr – Wraparound-Lens Ceiling Light
        2) Substitution Permitted: Section 01 60 00
    b. Description:
        1) 48" Long
        2) Two T8 4' Bulbs
        3) 32W per T8 bulb
        4) Include bulbs with installation

2. UFO High Bay Light
    a. Manufacturers:
        1) Aries High Bay Light, 100W – WareLight

2) Substitutions Permitted: Section 01 60 00 – Product Requirements

b. Description:
1) LED
2) 100W, 150 lumens/Watt
3) 15000 Lumen
4) 4000K Color Temperature
5) Input Voltage: 120V – 277V

2.14 **Section 26 56 00** – Exterior Lighting – REPLACE SECTION 2.1 IN ITS ENTIRETY AND REPLACE WITH '2.1 LUMINAIRES':

A. Exterior Lighting
1. Motion Sensing Light
a. Manufacturers:
1) Lithonia Lighting – HGX LED 2RH ALO SWW2 120 PIR DDB
2) Substitutions Permitted: Section 01 60 00 – Product Requirements
b. Description
1) Motion-activated
2) For exterior application
3) Mounts to recessed junction box (4x4 round, square, or octagonal)
4) Adjustable light orientation, without tools required
5) Adjustable light output

2. Floodlight
a. Manufacturers:
1) Commercial Electric 46-Watt Bronze Outdoor Integrated LED Street Lamp
2) Substitution Permitted: Section 01 60 00
b. Description:
1) 5000 Lumens, 46-Watt
2) Power: Hardwired
3) IP65

2.15 Section 31 23 17 – Trenching – Remove section 2.1.A Fill Materials and replace with:

A. Imported Pipe Embedment:
1. Imported fill as described in the Revisions to Standard Specifications, Revisions to Section 32 11 23.

2.16 **Section 31 25 13** – Erosion Controls – ADD THE FOLLOWING TO SECTION "2.1 ROCK MATERIALS":

A. Drain Rock
1. Manufacturers:
a. Graniterock ¾" Drain Rock
b. Substitution Permitted: Section 01 60 00
2. Type:
a. ¾" Drain Rock, nominal size
b. Clean and washed, free of organics

c. With 100% of grain sizes smaller than 1" per sieve analysis
d. With 60% of grain sizes between ¾" and ½" per sieve analysis

2.17 **Section 31 37 00** – Rip Rap – ADD THE FOLLOWING TO SECTION "2.1 MATERIALS":

A. Geotextile
1. Manufacturer: Tensar TriAx Geogrid or approved equal
2. Type: TX 130S

2.18 **Section 32 11 23** – ADD THE FOLLOWING TO SECTION 2.1 "AGGREGATE MATERIALS"

A. Class 3 Aggregate Base
1. Description:
a. With less than 4% organics
b. Adhering to 2018 CALTRANS Standard Specifications 26-1.02C
c. For 3/4-inch maximum aggregate gradation

Aggregate Gradation

Sieve size	Percentage passing			
	1-1/2 inch maximum		3/4 inch maximum	
	Operating range	Contract compliance	Operating range	Contract compliance
2"	100	100	--	--
1-1/2"	90–100	87–100	--	--
1"	--	--	100	100
3/4"	50–90	45–95	90–100	87–100
No. 4	25–60	20–65	40–70	35–75
No. 30	10–35	6–39	12–40	7–45
No. 200	3–15	0–19	3–15	0–19

B. Imported Fill
1. Description:
a. Sandy Loam
b. With less than 4% organics
c. With 85% **or greater** of grain sizes smaller than 2-1/2"
d. Adhering to the following texture analysis:

Imported Fill

Texture Type	Percentage Makeup
Sand	65-75%
Silt	15-20%
Clay	10-15%

2.19 **Section 33 05 17** – Precast Concrete Valve Vaults and Meter Boxes –REMOVE SECTION '2.1 A WATER METER BOX MANUFACTURERS' IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:

A. Water Meter Box Manufacturers:

1. Christy N36 water meter box and lid or approved equal
    a. Size: 12 inch (H) x 30 inch (L) x 17 inch (W)
    b. Material: Concrete
    c. Utilize one box for water meter and one box for check valve and union as shown in drawings

2.20 **Section 33 05 17** – Precast Concrete Valve Vaults and Meter Boxes – ADD THE FOLLOWING TO SECTION '2.1.C –VALVE VAULT AND METER BOX FRAMES AND COVERS'

A. Custom Vault Lid
1. Furnish and install single door access hatch with safety grate as shown on the Drawings. The access hatch shall be integrally cast into the concrete slab. The top of the access hatch shall be flush with the top of the concrete roof. The minimum cleat hatches opening dimensions shall be as shown on the Drawings the manufacturer shall warranty that the assembled access hatch shall be free of defects in material and workmanship for a period of (5) five years from date of project acceptance.
2. The door shall be equipped with a hold open arm. Door shall lock open in the 90-degree position.
3. Hatch cover shall be ¼-inch aluminum diamond plate. The access hatch hardware shall be constructed of grade 316 stainless steel.
4. Hatch shall be supplied with a recessed slamlock, with keyway protected by a threaded plug. Plug shall be flush with the top of the diamond plate.
5. Safety grate shall be provided beneath the hatch cover for fall through protection when the covers are open. The safety grate shall be reinforced to support a minimum live load of 300 PSF with a maximum deflection of $1/150^{th}$ of the span.
6. Safety grate shall be provided with a permanent hinging system that will lock the gates in the 90 degree position once opened. Grate openings shall be 5" by 5" to allow for visual inspection of the wet well while the grating is in place.

2.21 **Section 33 11 13** – Water Distribution Mains – ADD THE FOLLOWING TO SECTION '2.1 WATER PIPING'

A. Plastic Tubing
1. Manufacturers:
    a. McMaster-Carr – Masterkleer PVC Tubing
    b. Substitutions Permitted: Section 01 60 00 – Product Requirements

2. Description:
    a. Size: As shown on Drawings
    b. NSF/ANSI 51

B. Plastic Tubing Fittings and Accessories
1. Barbed Check Valves for Tubing
    a. Manufacturers:
        1) McMaster-Carr – Nylon body spring-loaded piston check valve
        2) Substitutions Permitted: Section 01 60 00 – Product Requirements

    b. Description:

1) Size: as shown on Drawings
2) Male NPT Inlet, Male Barbed Outlet
3) Nylon body
4) Stainless Steel 316 Spring

2.22 **Section 33 11 13** – Water Distribution Mains – ADD THE FOLLOWING AFTER SECTION '2.6 ACCESSORIES':

A. Pipe Supports
1. Unistrut
a. Pipe Support: Model P1000, Model P1001
1) ST Finish – Stainless Steel Type 316
b. Pipe Clamps: Model P1119 for 3-inch pipe, P1117 for 2-inch pipe, P1113 for 1-inch pipe
1) ST Finish – Stainless Steel Type 316
2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Stainless Steel Splash Plate Assembly
1. Stainless Steel Pipe Support Flats
a. Type:
1) ¼" Thick, 1" Wide, for use in 2' lengths

2. Stainless Steel Splash Plate Square
a. Type:
1) ¼" Thick, 8" Square
2) Type 316 Stainless Steel

C. Hose Clamps
1. Manufacturers:
a. McMaster-Carr - General Purpose Worm-Drive clamp with Nonslip Screw
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Type:
a. Size: 2-3/4" to 3-3/4"
b. 301 Stainless Steel
c. Band Width: 9/16"
d. Band Thickness: 0.022"

D. Marker Posts
1. Manufacturers:
a. Blackburn – Hybrid 1-Rail Post
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Type:
a. 5' Height Minimum (Including buried height)
b. Supply with decal or engraved marking of specified appurtenance

E. Poly Tank Ring Wall
1. Description:
a. 14 gauge galvanized steel, 6-inch width

2.23 **Section 33 11 13** – Water Distribution Mains – REPLACE PART 3.9.A THRUST RESTRAINTS WITH THE FOLLOWING:

A. Thrust Restraint
   1. Provide valves, tees, bends, caps, and plugs with concrete thrust blocks or engineer-approved restrained joints. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks or restrained joints at each elbow or change of pipe direction to resist resultant force and so pipe and fitting joints will be accessible for repair. Provide thrust block restraint bearing on subsoil as shown in Drawings and in compliance with AWWA standards.

2.24 **Section 33 11 16** - Water Distribution Valves and Hydrants – ADD THE FOLLOWING TO '2.11 ACCESSORIES':

A. Pressure Relief - 130 psi set pressure
   1. Manufacturer:
      a. Kunkle (www.emerson.com)
         1) Model: 171S
      b. Cla-Val (www.cla-val.com)
         1) Model: 55B-60: 40-200 psi range
      c. Stra-Val (www.straval.com)
         1) Model: RVL-21
   2. Type:
      a. 2 inches and smaller: bronze or stainless steel body, teflon or silicone seat, steel stem and springs, automatic, direct pressure actuated.
      b. Threaded Outlet
      c. Factory set to 75 psi for flow over 30 gpm
      d. Size: As shown on Drawings

B. Sample Tap – plain-end sampling valve
   1. Manufacturer: Legend Valve T-532 or approved equal

   2. Description:
      a. Inlet Size: ½ or ¾ inch, as specified on Drawings
      b. Model: T532NL
      c. Material: bronze or brass
      d. Outlet to be plain end, NOT threaded

C. Pressure Gauge
   1. Manufacturer: McMaster-Carr PN: 4090K15 or approved equal

   2. Description:
      a. Size: 2 ½ inch dial diameter, liquid type
      b. ¼" NPT Connection
      c. 0-100 PSI Reading Range

D. Transition Coupler – HDPE to PVC compression fitting
   1. Manufacturer: ELOPRESS or approved equal
   2. Size: as sized on Drawings

3. Description: Mechanical compression for use with high, medium, or low density polyethylene pipes. Gray side for PVC Sc. 40/80 connection, blue side for HDPE connection

E. Reducing Transition Coupler – HDPE to PVC compression fitting
   1. Manufacturer:
      a. CEPEX or approved equal
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Size: 1" HDPE end, ¾" PVC end
   3. Description: Mechanical compression for use with high, medium, or low density polyethylene pipes. Gray side for PVC Sc. 40/80 connection, blue side for HDPE connection.

F. Tapping Saddles
   1. Manufacturers:
      a. McMaster-Carr Thick-Wall Plastic Pipe Fittings Service Saddle
      b. Mueller DR2S Ductile Iron Service Saddles
      c. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Description:
      a. 200+ psi maximum
      b. 4.5" width or lesser for 6" x 2" size
      c. Wraparound Design
      d. Threaded tee connection
      e. Size: As shown in drawings

G. Lockable PVC Ball Valve
   1. Manufacturers:
      a. Hayward – TBH Series True Union Ball Valve
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Details:
      a. Size: as sized in Drawings
      b. Connection: Socket
      c. Pressure Rating: 150 PSI
      d. Full-port Design
      e. Standard Lock-Out Feature Securable to Body
      f. Provide Lock and Key

H. PVC Ball Valve
   1. Manufacturers:
      a. GF Piping Systems – Ball Valve Type 375
      b. Substitutions Permitted: Section 01 60 00 – Product Requirements
   2. Details:
      a. Size: as sized in Drawings
      b. Connection: Socket
      c. Pressure Rating: 150 PSI
      d. Full-port Design

I. PVC Check Valve
   1. Manufacturers:
      a. Hayward Check Valve, Inline True Union

b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Size: as sized on Drawings
3. Description:
    a. Union connection
    b. For horizontal or vertical installation, as shown in drawings

J. Iron Check Valve
1. Manufacturers:
    a. MILWAUKEE VALVE Swing Check Valve
    b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Size: As sized on drawings
3. Description
    a. Flange x Flange connections
    b. Rated for 200 psi
    c. Cast-iron Construction

K. Lockable Butterfly Valve
1. Manufacturers:
    a. McMaster-Carr – 316 Stainless Steel Flow-Adjustment Lug Valve
2. Size: As sized on Drawings
3. Description
    a. Manual actuation, lockable butterfly valve
    b. Flanged Connection

L. Pressure Reducing Valve
1. Manufacturers:
    a. Zurn-Wilkins – Model ZW209BP
    b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Size: As sized on Drawings
3. Description:
    a. Pressure Reducing Valve with Low-Flow Bypass, Pilot Controlled
    b. To handle low flow ranges of 0-15 GPM
    c. Ductile Iron Body
    d. 150# Flange Ends
    e. To be set to pressures shown on Drawings
    f. 3” or 6” main body, as shown on Drawings

M. Altitude Valve
1. Manufacturer: CLA-VAL Altitude Valve for One-Way Flow or approved equal
    a. E-210-01, Globe orientation
    b. Size: 6”
    c. Connection: 150# Flanged
    d. Adjustment Range: 5-40 ft
    e. Optional Features
        1) Check Valve with Isolation Valve
        2) Dry Drain

2. Sensing Line (for Altitude Valve)
    a. ¾” Schedule 80 PVC

b. Aboveground PVC shall be coated with PVC primer followed by acrylic paint for UV protection
c. Install at minimum 2% slope

N. Strainer
1. Manufacturer:
a. Cla-Val X43H "H" Strainer or approved equal
1) Body, Cover, & Support Frame: Ductile Iron – ASTM A536
2) Size: As specified in Drawings
3) Strainer: 316 Stainless Steel
4) Strainer Mesh: 10 Mesh
5) Pressure Rating: Class 150 lb
6) Connection 150# Flanged
7) Opens for maintenance from top

O. Air Relief Valve
1. Manufacturer:
a. VALMATIC
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Connection Size: 1" or 2", as sized on Drawings
3. Orifice Size: 1/16"
4. Certified Lead Free
5. NSF 61

P. Combination Air Valve
1. Manufacturer:
a. VALMATIC
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description:
a. Combining the functions of an Air/Vacuum Valve and Air Release Valve
1) 2" Size
2) Release air during fill
3) Single Body
4) Vacuum protection
5) Release entrained air during operation
b. NPT Inlet Connection
c. NSF 61
d. AWWA C512

Q. Restrained Flange
1. Manufacturers:
a. EBAA Iron MEGAFLANGE
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description
a. Restrained Flange Connection
b. Size: As sized on drawings, where restrained joints specified

R. Galvanic Flange
1. Manufacturer:

a. McMaster-Carr PN: 9165K79 (https://www.mcmaster.com/9165k79)
b. Substitutions Permitted: Section 01 60 00 – Product Requirements

2. Type:
   a. Size: as specified on Drawings
   b. Gasket kit with bolt holes for dissimilar metals. “Includes 4 full-length phenolic sleeves, 8 phenolic washers, 8 zinc-plated metal washers”.

2.25 **Section 33 12 13** – Water Service Connections –REMOVE SECTION ‘2.5 WATER METERS’ IN ITS ENTIRETY AND REPLACE WITH

“A. Manufacturer and Product List:

1. System Water Meter – Seametrics IMAG4700p-0400-F1-P-A1-X-01-015D – or approved equal
   a. Magnetic meter with both ‘one pulse’ and ‘4-20mA’ outputs, 150-lb ANSI flanged, NSF gaskets, 60 Hz AC power
   b. Size: 4 inch
   c. Connection Type: Flanged, NSF Gaskets
   d. Analog Output: 4-20 mA
   e. With Data Logger

2. Residential Water Meter – Badger Meter – Recordall Disc Meter – Model 35 - ¾” – or approved equal
   a. ¾” NPT Connections
   b. Lead Free Bronze Alloy
   c. ANSI/AWWA C700
   d. Direct Magnetic Drive

B. Where indicated, furnish materials in accordance with manufacturer and model indicated on drawings.”

2.26 **Section 33 16 20** – Bolted Steel Water Storage Tanks – REMOVE SECTION ‘2.7 FLEXIBLE PIPE COUPLINGS’ AND REPLACE WITH:

A. Manufacturer List:
   1. EBAA Iron Inc. FLEX-TEND Force Balanced Flexible Expansion Joint
   2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description:
   1. 4 or 6 inch, as specified in Drawings
   2. Flanged #150 Connection
   3. Ductile Iron
   4. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of 20º. The flexible expansion fitting shall not expand or exert an axial imparting thrust under internal water pressure with a total minimum linear travel of 8-inches.
   5. Shall be installed vertically plumb and horizontally level

2.27 **Section 33 16 20** – Bolted Steel Water Storage Tanks – ADD TO SECTION "2.8 TANK ACCESSORIES"

C. Tank Float Valve
1. Manufacturers:
a. Grainger – Float Valve: Pipe Mount, 3 in size, NPT, 400 GPM Valve Flow
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description:
a. FNPT Connections
b. Stainless Steel Rod, 3/8" NPT, 20" Length
c. 400 GPM at 60 psi, 125 GPM at 20 psi
d. 8" Float Size, Stainless Steel Float

D. Tank Float Switch
1. Manufacturers:
a. SJE Rhombus – SJE SignalMaster – 15SGMWENC
b. Substitutions Permitted: Section 01 60 00 – Product Requirements
2. Description
a. Externally Weighted
b. Mechanically-activated, snap action contacts
c. High impact, corrosion resistant, polypropylene housing
d. Normally-closed model (low level), White Cap
e. 5 amp, 125/250 VAC, 50/60 Hz
f. 15-foot cable

2.28 **Section 44 44 14** – Chemical Feed Pumps – REPLACE SECTION "2.1 CHEMICAL FEED PUMPS" IN ITS ENTIRETY AND REPLACE WITH:

A. Manufacturers:
1. Stenner
a. Classic series Single Head Adjustable Pump - 85MJH2A1STAA
1) https://sportal.stenner.com/85mjh2a1staa
2. Substitutions permitted, unless otherwise specified in Drawings. Section 01 60 00 – Product Requirements

B. Description:
1. With flow rate set by external dial ring
2. Self-priming
3. 3-point roller design
4. ¼" Tubing Connections
5. 120 V, 60Hz, 1-phase
6. Materials of Construction:
a. Santoprene Pump Tube and Duckbill Check Valve
b. Polyethylene Suction and Discharge tubing and ferrules
c. PVC or Polypropylene Tube and injection Fittings
7. Discharge Capacity: 17 GPD
8. Discharge Pressure: 100 psi maximum

C. Pump Accessories:

1. Furnish:
    a. Stenner - Time adjustable controller for proportional injection
        1) PCM10 by Stenner
    b. Connecting Nuts
    c. Ferrules
    d. Duckbill Check Valve
    e. Weighted Suction Line Strainer
    f. Additional Pump Tube
    g. Additional Latches, 2
    h. Mounting Bracket
    i. Manual

2.29 **Section 44 44 14** – Chemical Feed Pumps – ADD THE FOLLOWING SECTION TO "PART 2 PRODUCTS"

A. Secondary Containment
    1. Manufacturers:
        a. McMaster-Carr Plastic Spill-Control Pallet with Bladder – 5148T23
            1) Include bladder accessory – McMaster-Carr 5148T85
        b. Substitutions Permitted: Section 01 60 00 – Product Requirements
    2. Description:
        a. Style C
        b. For one 55-gallon drum, 75-gallon capacity
        c. EPA 40, CFR 264.175
        d. With bladder accessory

B. Tank Mixer
    1. Manufacturers:
        a. J.L. Wingert Mixers
        b. Substitutions permitted: Section 01 60 00 – Product Requirements
    2. Description:
        a. ¼ horsepower
        b. 1725 rpm
        c. With clamp
        d. With 316 Stainless Steel Shaft and Impeller

PART 3 EXECUTION

3.12 **Section 06 10 00** – Rough Carpentry – ADD THE FOLLOWING SECTION AFTER '3.4 TOLERANCES'

3.5 APPLICABLE STANDARDS

A. Structure shall adhere to UBC Standards

3.13 **Section 26 05 19** – Electrical Conductors and Cables – ADD THE FOLLOWING SECTION TO '3.4 BUILDING WIRE':

F. Install buried electrical cable in conduit
1. Conductor: AWG size and length per plans
2. Insulation Voltage Rating 600 volts
3. Insulation Type USE-2, XHHW-2, or RHW-2

3.14 **Section 31 23 17** – ADD THE FOLLOWING TO SECTION '3.3 TRENCHING':

L. Cultural Monitor

Contractor shall hire Owner-approved cultural monitor to observe all earth disturbing activities. This individual will observe such activities for the presence of historic, cultural, or archaeological properties. The Tribal Cultural Monitor represents the Tribe's cultural knowledge and interests during construction.

3.15 **Section 33 11 13** – ADD THE FOLLOWING SECTION TO 'PART 3 EXECUTION':

A. Marker Posts
1. Place with Engineer or YPUD Direction
2. Shall be installed with minimum 3 feet bury depth and minimum 2 feet aboveground.

END OF SECTION

SECTION 01 27 00

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary.

B. Estimated quantities.

C. Survey and measurements.

D. Payment for increased or decreased quantities.

E. Omitted items.

F. Partial payments.

G. Payment for material delivered.

H. Final payment.

I. Incidental work.

J. Description of pay items

1.2 SUMMARY

A. Work covered by this section includes method of measurement and basis of payment for all divisions included.

B. Payment for the various items of the Bid Schedules, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, materials, labor, supplies, manufactured articles, transportation, and temporary facilities required to complete the work in accordance with contract documents including incidentals.

C. Respective prices and payment shall constitute full compensation for all work completed including incidentals.

D. All items not expressly listed as being provided by others that are necessary for the completion of work shall be furnished and installed by the Contractor.

E. No payment shall be made for mobilization and demobilization of equipment, unless it is explicitly included as a bid item.

F. The Contractor, in case of unit-price items measured for payment, shall be paid for the actual amount of Work accepted and for the actual amount of materials in place, as shown by final measurement. Plan quantity items shall be paid for at the unit price for the quantities shown on the plans and tabulated in the bid form.

G. The Contractor, in case of lump sum amounts, or by plan quantities, shall be paid for the percentage of the work item completed as determined by the Engineer.

H. All units of measurement shall be standard United States convention as applied to the specific items of Work by tradition and as interpreted by the Engineer.

1.3 ESTIMATED QUANTITIES

A. All quantities stipulated in the bid schedule or other contract documents are approximate and are to be used: (1) as a basis for estimating the probable cost of the work and (2) for the purpose of comparing the bids submitted.

B. The Contractor shall be paid for actual quantities installed based on the quantities measured in the field. The actual amounts of work completed and materials furnished may differ from estimated quantities. The Contractor shall make no claim for damages, anticipated profits, or otherwise, on account of differences between the estimated amounts and the actual amount of work performed and materials furnished.

C. The payment of any partial estimate or of any retained percentage in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.4 SURVEY AND MEASUREMENTS

A. All quantity measurements shall be the responsibility of the Contractor and will be verified by the project Engineer.

B. All measurements and subsequent payments will be based on completed and accepted work performed in strict accordance with the drawings, specifications, and other contract documents.

1.5 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

A. When alterations in the quantities of work are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of Work done. No allowance will be made for anticipated profits.

1.6 OMITTED ITEMS

A. Should any items contained in the Bid Form be found unnecessary for the proper completion of the Work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.7 PARTIAL PAYMENTS

A. Partial payments shall be made monthly as the work progresses. All partial invoices and payments shall be subject to the provisions of the General and Supplementary Conditions.

1.8 PAYMENT FOR MATERIAL DELIVERED

A. When requested by the Contractor and at the discretion of the Engineer, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into Bid Items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Engineer. Payment shall require paid invoices and proof of insurance and be subject to the provisions of the General and Supplementary Conditions.

B. No partial payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind that are not a permanent part of the Contract.

1.9 FINAL PAYMENT

A. The Engineer will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such Work. The Contracting Officer shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.10 INCIDENTAL WORK

A. Incidental work items for which separate payment will not be made includes the following items, unless explicitly included as a bid item. This is not a complete and comprehensive list – see other Technical Specifications for more information:
   1. Pre-Construction photographs.
   2. Project record documents
   3. Traffic control plan and traffic regulation.
   4. Signs.
   5. Clean up and restoration of property.
   6. Restoration of fences and other structures.
   7. Cooperation and coordination with other contractors and utility companies.
   8. Utility crossings and relocations, unless otherwise paid for.
   9. Temporary utility service to buildings, as required to maintain service during construction.
   10. Minor Items – such as relocation of sign posts, guard rails, rock wall, mail boxes, curbs, traffic loop detectors, pavement markings, etc., damaged as a result of construction activities.
   11. Trench boxes, steel and/or wood sheeting as required, including that left in place.
   12. Maintenance of all existing water flows and repair of existing water pipes.
   13. Dust control.
   14. Erosion control.
   15. Clearing, grubbing, and stripping.
   16. Loaming, seeding, grading, liming, fertilizing, mulching, and watering.
   17. Routine flagman services.
   18. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications, and other submittals required by the Contract Documents.

19. Repair and replacement of water lines, culverts, under-drains, rock lined drainage trenches in streets and other utilities damaged by construction activities and corresponding proper disposal of removed materials unless otherwise paid for.
20. Weather protection.
21. Permits not otherwise paid for or provided by the Owner.
22. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
23. Mobilization and demobilization, unless specifically listed in Bid Schedule.
24. Excavation including the test pits specifically shown or ordered by the Engineer to establish underground utility locations.
25. Contract administration and insurance.
26. Test pits to establish in place field soils density, groundwater conditions, or requirements for de-watering.
27. Pipe markings.
28. Construction Trailer.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 DESCRIPTION OF PAY ITEMS

A. The following sections describe the measurement of and payment for the Work to be done under the respective items listed in the Bid Form.

B. Each unit or lump sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the Work completed.

SECTION 01 27 00: MEASUREMENT AND PAYMENT

A. Mobilization and Demobilization:
   1. Basis of Measurement: By lump sum. Unless specifically listed in Bid Schedule, mobilization and demobilization shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.
   2. Basis of Payment: Includes all labor, equipment and materials to mobilize to and demobilize from the project site to complete the work outlined in the contract documents and for temporary facilities and controls as required. NOTE: Mobilization and demobilization line item shall not exceed 10% of total bid amount.

SECTION 02 30 00: CUTTING AND PATCHING

A. Hot Mix Asphalt
   1. Basis of Measurement: by Cubic Yard
   2. Basis of Payment: Includes all labor, equipment, material, cutting and patching, backfill and compaction, asphalt repair, and traffic control.

SECTION 03 30 00: CAST IN PLACE CONCRETE

A. Concrete

1. Basis of Measurement: by Cubic Yard
2. Basis of Payment: Includes all labor, equipment, materials, excavation, form-setting, reinforcement, compaction, placement and curing, finishing, testing,

SECTION 06 10 00: ROUGH CARPENTRY

A. Wood Frame Building – Water Treatment Building
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor, parts, installation, excavation, backfill and compaction, foundation, door steps, walls, insulation, openings, penetrations, frames, finishes, insulation, grading, roofing, paneling, accessories, pipe supports, building wiring, painting, and finishes.

SECTION 07 71 23: MANUFACTURED GUTTERS AND DOWNSPOUTS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 08 13 14: STANDARD STEEL DOORS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 13 34 19: METAL BUILDING SYSTEMS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Metal Frame Building - Sand Filter Building
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor, parts, installation, excavation, backfill and compaction, foundation, door step, walls, openings, penetrations, frames, finishes, grading, roofing, accessories, pipe supports, pipe accessories, building wiring, painting, and finishes.

SECTION 22 05 03: PLUMBING PIPING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 22 11 00: FACILITY WATER DISTRIBUTION

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Magnetic Flow Meter
   1. Basis of Measurement: by Unit, noted with or without box housing

2. Basis of Payment: Includes all labor, parts, water connection, disinfection, testing, wiring and connection, vault and supports when specified, verification, and adjustment.

C. Pressure Gauge
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, parts, connection, disinfection, testing, and installation.

D. Booster Pump
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, parts, installation, disinfection, testing, accessories, water connection, electrical connection, pump controls, pump starter, pump saver, and control connection.

E. 5000-Gallon Poly Equalization Tank
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, delivery, parts, 5,000-gallon polyethylene tank, float system, ringwall and stakes, installation, tank penetrations, connections, excavation, foundation, backfill, compaction, disinfection, and testing.

F. Roughing Filter
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, parts, excavation, installation, backfill and compaction, foundation, connection, accessories, concrete backwash structure, butterfly valve, disinfection, and testing.

G. Unistrut Pipe Support
   1. Basis of Measurement: by Linear Foot
   2. Basis of Payment: Includes all labor, parts, connections, fasteners, delivery, and accessories.

SECTION 22 44 00: PLUMBING FIXTURES

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 26 05 03: EQUIPMENT WIRING CONNECTIONS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 26 05 19: ELECTRICAL CONDUCTORS AND CABLES

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 26 05 33: CONDUIT AND BOXES FOR ELECTRICAL SYSTEMS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. 2" Conduit and Cable
   1. Basis of Measurement: By linear foot, for specified size
   2. Basis of Payment: Includes labor, cable, pull boxes, conduit, materials, connections, delivery, handling, installing, excavation, backfill, bedding, and compaction.

C. Conduit, No Cable
   1. Basis of Measurement: By linear foot, for specified size
   2. Basis of Payment: Includes labor, pull boxes, conduit, materials, delivery, handling, installing, excavation, backfill, bedding, compaction, and coordination with and inspection by utility company.

D. Tank Site, Conduit and Cable
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes labor, cable, pull boxes, conduit, materials, connections, delivery, handling, installing, excavation, backfill, bedding, and compaction.

SECTION 26 32 13: ENGINE GENERATORS

A. 18 kW Propane Generator and Pad
   1. Basis of Measurement: by Lump Sum
   2. Basis of Payment: Includes all labor, parts, assembly, excavation, foundation, compaction, protection posts, testing, and connection.

B. Automatic Transfer Switch
   1. Basis of Measurement: by Lump Sum
   2. Basis of Payment: Includes all labor, parts, assembly, wall mounting, testing, and electrical connections.

SECTION 26 32 43: BATTERY ENERGY STORAGE SYSTEM

A. Grid-charged Battery Backup System
   1. Basis of Measurement: by Lump Sum
   2. Basis of Payment: Includes all labor, parts, installation, batteries, wall mounting, interface, cabinet, battery cells, inverter, conduit and cable, connections. Automatic transfer switch, and testing.

SECTION 26 27 26: WIRING DEVICES

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 26 51 00: INTERIOR LIGHTING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 26 56 00: EXTERIOR LIGHTING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 31 10 00: SITE CLEARING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Site Clearing
1. Basis of Measurement: Lump Sum
2. Basis of Payment: Includes all labor, cutting, clearing, and removal of plants and deadwood, and transport.

C. Utility Pad and Bollards
1. Basis of Measurement: Lump Sum
2. Basis of Payment: Includes all labor, parts, installation, excavation and grading, compaction, base rock, concrete and forming, reinforcement, utility stubs, bollards, and all coordination with and adherence to utility company requirements.

SECTION 31 22 13: ROUGH GRADING

D. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

E. Retaining Wall
1. Basis of Measurement: by Lump Sum
2. Basis of Payment: Includes all labor, design, excavation, fill, drain rock, compaction, grading, perforated piping, a cleanout, materials, and accessories.

F. Excavation and Grading
1. Basis of Measurement: Lump Sum
2. Basis of Payment: Includes all labor, staking of final grade, excavation, grading, backfill, compaction, transport of spoils, testing,

SECTION 31 23 17: TRENCHING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Cultural Monitoring
1. Basis of Measurement: Lump Sum
2. Basis of Payment: Includes hiring of Owner approved Tribal cultural monitor, who shall be on site to observe all earth disturbing activities.

SECTION 31 25 13: EROSION CONTROLS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Drain Dissipater
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all parts, labor, installation, excavation, backfill, grading, geotextile fabric, rip rap, flapper valve, and accessories.

C. 6’ Manhole Drain Collector
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all parts, labor, installation, excavation, backfill, grading, concrete curing, perforations, connections, grout, lid, and accessories.

D. Stormwater Polltion Prevention Plan and EPA CGP
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all document preparation and correspondence required to apply, acquire, and maintain these permits, labor, stormwater and runoff controls, and all permitting and application fees related.

SECTION 31 37 00: Rip Rap

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. 3-6” Rip Rap
   1. Basis of Measurement: Cubic Yard
   2. Basis of Payment: Includes all rock and materials, transport, labor, excavation, placement, and backfill.

SECTION 32 11 23: AGGREGATE BASE COURSES

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Aggregate Base Course
   1. Basis of Measurement: by Cubic Yard, for Class of Base
   2. Basis of Payment: includes all labor, material, transportation, excavation, placement, levelling, compaction, and testing.

C. Imported Fill
   1. Basis of Measurement: by Cubic Yard
   2. Basis of Payment: includes all labor, material, transportation, excavation, placement, levelling, compaction, and testing.

SECTION 32 92 19: SEEDING

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 33 05 17: PRECAST CONCRETE VALVE VAULTS AND METER BOXES

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Vault for DWR Connection, 2/C04
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor and materials, transport, excavation, backfill, compaction, and piping appurtenances contained within.

SECTION 33 11 13: WATER DISTRIBUTION MAINS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Water Main
   1. Basis of Measurement: by Linear Foot, for material and size specified
   2. Basis of Payment: Includes hand trimming, excavation, backfill, compaction, piping and fittings, pipe embedment, pipe markers, concrete thrust restraints, installation, connections to public utility water source and piping, accessories, disinfection and testing, and seeding.

C. Transmission Main
   1. Basis of Measurement: by Linear Foot, for material and size specified
   2. Basis of Payment: Includes hand trimming, excavation, backfill, compaction, piping and fittings, pipe bedding, pipe markers, concrete thrust restraints, installation, connections to public utility water source and piping, accessories, disinfection and testing, and seeding.

D. Drain Line
   1. Basis of Measurement: by Linear Foot, for material and size specified
   2. Basis of Payment: Includes hand trimming, excavation, backfill, compaction, piping and fittings, pipe embedment, pipe markers, concrete thrust restraints, installation, and accessories.

E. Culvert Crossing
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, excavation, backfill, compaction, restraints and thrust blocking, casing pipe and insulation, potholing, and other investigations.

F. Connection at Intake

1. Basis of Measurement: Lump Sum
2. Basis of Payment: Includes all labor, parts, installation, piping, accessories, connections, support blocking, hand trimming, and testing.

SECTION 33 11 16: WATER DISTRIBUTION VALVES AND HYDRANTS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Gate Valve and Riser
   1. Basis of Measurement: By Unit, for size and type in Bid Schedule.
   2. Basis of Payment: Includes all labor, parts, excavation, installation, disinfection and testing, compaction, valve, riser where specified, (1) gate valve key, protection posts, concrete collar, thrust blocks or restraints, backfill, fittings and accessories, and other appurtenances.

C. Check Valve and Box
   1. Basis of Measurement: by Unit, for size and type
   2. Basis of Payment: Includes all labor, parts, excavation, installation, disinfection and testing, compaction, valve, box where specified, backfill, fittings and accessories, supports, and other appurtenances.

D. Flush Hydrant
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, parts, disinfection and testing, installation, connection, excavation, backfill, compaction, and fittings and accessories.

E. Air Release Valve
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, parts, disinfection and testing, installation, connection.

F. Combination Air Valve
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, excavation, compaction, concrete and forms, parts, disinfection and testing, installation, connection.

G. Float Valve
   1. Basis of Measurement: by Unit
   2. Basis of Payment: Includes all labor, installation, connection fittings, adjustment, accessories, disinfection, and testing.

H. Pressure Reducing Valve and Box
   1. Basis of Measurement: by Unit, for size specified
   2. Basis of Payment: Includes all labor, excavation, installation, backfill, compaction, enclosure, support, fittings, connection to main, adjustment, testing and disinfection, valving, pressure gauges, accessories, and other appurtenances.

I. Altitude Valve and Box
   1. Basis of Measurement: Lump Sum

2. Basis of Payment: Includes all labor, excavation, backfill, compaction, box and housing, base, sensing line, strainer, supports, tank connection, PVC sensing line, pressure gauges, adjustment, disinfection, and testing.

SECTION 33 12 13: WATER SERVICE CONNECTIONS:

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Residential Water Meter and Box
   1. Basis of Measurement: By the unit.
   2. Basis of Payment: Includes all labor, excavation, meter, concrete box, meter setting equipment, supports, backfilling, compaction, fittings, and accessories.

C. Water Main Connection
   1. Basis of Measurement: Lump Sum
   2. Basis of payment: Pipe and fittings for domestic water service connections to buildings, pressure testing and disinfection, excavation, backfill, compaction, and labor.

SECTION 33 13 00: DISINFECTING OF WATER DISTRIBUTION

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

SECTION 33 16 20: BOLTED STEEL WATER STORAGE TANKS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. 60,000-Gallon Bolted Steel Storage Tank
   1. Basis of Measurement: Lump Sum
   2. Basis of payment: Pipe and fittings for domestic water service connections to buildings, pressure testing and disinfection, all labor and installation, drain gate valve, drain box, foundation, excavation, backfill and compaction, parts and delivery, float valve, pipe supports, and accessories.

SECTION 33 19 00: SLOW SAND FILTER

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Slow Sand Filter Media
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor, installation, each type and volume of media, level placement of layers, washing, and grading.

C. Sand Filter Basins, Vault
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor, installation, excavation, backfill, compaction, forms, reinforcement, penetrations, fastenings, underdrain and laterals, vault lid, vault, vault piping and accessories, level indicators, and support blocks.

SECTION 33 51 00: PROPANE GAS DISTRIBUTION

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Propane Tank and Foundation
   1. Basis of Measurement: by Lump Sum
   2. Basis of Payment: Includes all labor, parts, installation, foundation, excavation, backfill, compaction, propane connection, protection posts, service (shut off) valve, fill valve, relief valve, vapor return valve, withdrawal valve, fixed liquid level gauge, liquid level float valve, service valve, pigtails, regulator, tank dome, accessories, and connection to generator.

SECTION 44 10 15: WATER QUALITY MONITORING AND EQUIPMENT

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract. The following items are exceptions, provided they are listed in the Bid Schedule.

B. Water Monitoring Equipment, Piping, Tubing, and Controls
   1. Basis of Measurement: Lump Sum
   2. Basis of Payment: Includes all labor, installation, supports and fastenings, Ductile Iron Piping and accessories, gate valves, sample taps, data collection and wiring connections, PVC inlets and accessories, tubing and tubing accessories, pressure gauge, air release valve, flow switch, module channel controller, turbidimeters, differential pH sensor, temperature sensor, chlorine pump, chlorine day tank, chlorine tank mixer, chlorine analyzer, pipe supports, monitoring integration into YPUD Cloud system with relevant coordination and coding, and housings.

SECTION 44 44 14: CHEMICAL FEED PUMPS

A. Work described in this Section shall be merged with pay item(s) defined within the Measurement and Payment portion of other Sections of this Contract.

END OF SECTION

SECTION 22 11 00

FACILITY WATER DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Piping
2. Valves
3. Water Meters
4. Pipe hangers and supports
5. Pressure gages
6. Flow control valves
7. Relief valves
8. Hose bibs and Sample Taps
9. Exhaust Fans
10. Countertop
11. Window
12. Chemical Pumps
13. Booster Pumps

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete
2. Section 08 71 00 - Door Hardware
3. Section 22 05 03 - Plumbing Piping
4. Section 22 05 53 - Identification for Plumbing Piping and Equipment
5. Section 26 05 03 - Equipment Wiring Connections
6. Section 26 05 19 – Electrical conductors and Cables
7. Section 26 05 26 – Grounding for Electrical Systems
8. Section 26 05 33 – Conduit and Boxes for Electrical Systems
9. Section 33 13 00 - Disinfecting of Water Utility Distribution
10. Section 33 21 13 – Community Supply Wells

1.2 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.

B. American Society of Sanitary Engineering:
1. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.

C. ASTM International:
1. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

D. American Water Works Association:
1. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.

2. AWWA C702 - Cold-Water Meters - Compound Type.
3. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
2. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
3. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

F. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings (pressure booster systems): Indicate layout, general assembly, components, dimensions, weights, clearances, and methods of assembly.

C. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
5. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of valves and equipment.

C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

1.9 Furnish one packing kit for each size valve, two hose end vacuum breakers for hose bibs and two pump seals for each pump model.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Refer to Section 22 05 03.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Refer to Section 22 05 03.

2.3 UNIONS AND FLANGES

A. Refer to Section 22 05 03.

2.4 WATER METERS

A. Refer to Section 01 11 90.

2.5 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Unistrut
    a. Pipe Support: Model P1000

1) ST Finish – Stainless Steel Type 316
b. Pipe Clamps: Model P1117 for 2-inch pipe, P1113 for 1-inch pipe
1) ST Finish – Stainless Steel Type 316
2. Grainger
a. Pipe Straps / Routing Clamps: Galvanized, for pipe or conduit size as specified in drawings
3. Substitutions Permitted: Section 01 60 00 - Product Requirements.

2.6 PIPE WALL BOOT

A. Manufacturer:
1. CSI Designs Pipetite Standard, PT4-000
2. Substitutions Permitted: Section 01 60 00 - Product Requirements

B. Type:
1. Flexible seal that allows pipeline movement without damage
2. Silicone construction
3. Self-sealing, no sealant required
4. For 4” Ductile Iron pipe

2.7 PRESSURE GAUGES

1. Refer to Section 01 11 90

2.8 SAMPLE TAPS

1. Refer to Section 01 11 90

2.9 PIPE LABELS

A. Manufacturer:
1. Seton
2. Substitutions Permitted: Section 01 60 00 - Product Requirements

B. Description:
1. Indicate flow direction
2. Indicate treated water vs non-treated water
3. Self-adhesive

2.10 EXHAUST FAN

A. Manufacturer:
1. McMaster-Carr: Dust-resistant direct drive wall-mount exhaust fan
a. Dust-Resistant Direct-Drive Wall-Mount Exhaust Fan, with 10" Diameter Blade, 120V AC, 1000 CFM Airflow | McMaster-Carr
2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description:
1. Airflow: 1000 cfm

2. Electrical connection: Hardwire, 120V single phase
3. Power: ¼ hp
4. Totally enclosed motor, steel frame

2.11 FLOOR DRAIN

A. Manufacturers
1. OATEY ABS Area Floor Drain with 4-inch Stainless Steel Cover
2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description
1. Stainless Steel or Noncorrosive Plastic Construction
2. Connects to 4" PVC
3. NSF 61 Compliant

2.12 LAMINATE COUNTERS

A. Manufacturers:
1. LABTech Supply Company
2. LOC Scientific
3. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description
1. Laminate material
2. Minimum 1" Thickness
3. Of dimensions as specified on Drawings
4. All edges with slight radius
5. With drip groove on underside
6. Black color – or other with engineer approval
7. Joints bonded by method of manufacturers recommendation
8. With supporting mounting brackets, described by
   a. Supported every 24" at maximum, and within 12" of an edge
   b. No span without at least 2 brackets
   c. Steel
   d. https://ironsupports.com/products/standard-front-mount-countertop-l-bracket?variant=15840870465607&gad_source=1&gad_campaignid=17519762048&gbraid=0AAAADKUw2q4zg4s4CocFlw3fuOaQKQUw&gclid=EAIaIQobChMI-K28-rL4kgMVjUhHAR3HeR2WEAQYBCABEgIEW_D_BwE
   e. 20" Deep minimum
   f. 14" High minimum
   g. Bracket Substations with approval from Engineer

2.13 SAFETY WINDOW

A. Manufacturers:
1. PGT Windows – Picture Window PW5520
2. Substitutions Permitted: Section 01 60 00 – Product Requirements

B. Description:

1. Picture window – does not open
2. With laminated impact resistant glass or approved safety glass alternative
3. Without grid or partitions

2.14 CHEMICAL TANK

A. Refer to Section 44 44 14 Chemical Feed Pumps

2.15 CHEMICAL FEED PUMP

A. Refer to Section 44 44 14 Chemical Feed Pumps

2.16 INFILTRATION GALLERY PUMP

A. Manufacturer:
1. Goulds 25CS10
   a. 7 Stage, 1hp

B. Description:
1. Delivers 20+ GPM at 160 ft of Head
   a. Operates within 85% of peak efficiency at this duty point
2. To operate at 3500 RPM
3. Single Phase, 60Hz, 115 V, 1 hp
4. With necessary accessories to attach to 4" pipe

2.17 BOOSTER PUMP

A. Manufacturer:
1. Goulds 7GB10 WaterGun Booster Pump
   a. 16 Stage, 1hp

B. Description:
1. Delivers 10+ GPM at 300 ft of head
   a. Operates within 85% of peak efficiency at this duty point
2. To operate at 3500 rpm
3. Single Phase, 60 hz, 115 V, 1 horsepower
4. 1" NPT ports for suction and discharge

2.18 ROUGHING FILTER

A. Manufacturer: Xylem AVGF-6 (Automatic Valveless Gravity Filter)

B. Description:
1. 6' Filter Diameter Model
2. 3 GPM per square foot - Service Flow Option
3. With 0.45mm-0.55mm sand
   a. "187-00665" as internally recognized by Evoqua/Xylem

2.19 EQUALIZATION TANK

A. Manufacturer: Norwesco Vertical Water Tank – Black or Dark Green – 5000 Gallon

B. Description:
1. 5000 Gallon Nominal Storage
2. 141” Diameter x 86” Height
3. NSF Approved

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - METERS

A. Install positive displacement meters in accordance with AWWA M6 and as shown on the plans.

3.4 INSTALLATION - GAGES

A. Install gages as shown on the drawings. Install one pressure gage for each pump, locate taps and on suction and discharge of pump; pipe to gage.

B. Install gage taps in piping where needed.

C. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage.

D. Provide instruments with scale ranges selected according to service with largest appropriate scale.

E. Install gages in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

F. Adjust gages to final angle, clean windows and lenses, and calibrate to zero.

3.5 INSTALLATION - ABOVE GROUND PIPING

A. Install valves with stems upright or horizontal, not inverted.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Provide spring loaded check valves on discharge of water pumps.

E. Provide flow controls in water circulating systems as indicated on Drawings.

F. Install potable water protection devices on plumbing lines where contamination of domestic water may occur; on flush valves, interior and exterior hose bibs.

G. Pipe relief from valves to exterior of building as shown in the Drawings.

H. Pipe back-flow preventers and drains to nearest floor drain.

3.6 INSTALLATION - PUMPS

A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump with concrete block so no weight is carried on pump casings.

C. Provide air cock and drain connection on horizontal pump casings.

D. Provide drains for bases and seals.

E. Check, align, and certify alignment of base mounted pumps prior to start-up.

F. Install base mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place. Refer to Section 03 30 00.

G. Lubricate pumps before start-up.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. Disinfect water distribution system in accordance with Section 33 13 00.

END OF SECTION

SECTION 26 01 00

GENERAL ELECTRICAL REQUIRMENTS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. It is the intent of this part of the Contract Documents to cover the work and materials necessary for erecting a complete electrical system, tested and ready for continuous use. The system shall be constructed in accordance with the Contract Documents, Federal, State, and Local codes and regulations.

1.2 RELATED WORK

A. The Contractor shall coordinate the work with other trades, and furnish and install the equipment in accordance with the manufacturer's requirements.

B. Related Sections:
1. Division 00 Procurement & Contracting Requirements
2. Division 01 General Requirements
3. Division 40 Process Integration

1.3 GENERAL PROVISIONS

A. Minimum sizes of equipment, and electrical devices, are indicated but it is not intended to show every offset and fitting, nor every structural or mechanical difficulty that will be encountered during the installation of the work

B. Work indicated on the Plans is approximately to scale, but actual dimensions and detailed Plans should be followed as closely as field conditions permit. Field verification of scale dimensions on Plans is governed by field conditions. Installation of systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination.

C. Contractor shall furnish and install modifications required to equipment locations and mounting, including concrete pads. Location of equipment is subject to final project layout. The Electrical Sub- Contractor shall coordinate all work with General Contractor. Discrepancies indicated on different Plans, between Plans and actual field conditions, or between Plans and Contract Documents shall be promptly brought to the attention of the Engineer for clarification, prior to purchasing and installing equipment. All modifications of equipment and locations shall be submitted for Engineer's review.

D. The alignment of equipment and conduit shall be adjusted to accommodate architectural changes, or to avoid work of other trades, without extra expense.

E. The Contractor shall furnish and install the parts and pieces necessary to the installation

of equipment, in accordance with the best practice of the trade, and in conformance with the requirements of these Contract Documents.

F. Items not specifically mentioned in these Contract Documents, or noted on the Plans, or indicated on reviewed shop drawings, but which are obviously necessary to make a complete working installation, shall be deemed to be included herein.

G. The Contractor shall lay out and install electrical work prior to placing floors and walls. Furnish and install sleeves and openings through floors and walls, required for installation of conduits. Sleeves shall be rigidly supported and suitably packed, or sealed, to prevent ingress of wet concrete. Spacers shall be installed in order to prevent conduit movement. Dimensions indicated for electrical equipment and their installation are restrictive dimensions.

H. The Contractor shall furnish and install inserts and hangers required to support conduits and other electrical equipment. If the inserts, hangers, sleeves, or other mounting hardware are improperly placed, or installed, the Contractor shall do necessary work, at their own expense, to rectify the errors.

I. Insulated conductors shall be capable of operating successfully at rated ampacity, without failure, with a minimum temperature rating of Minimum 75°C insulation rating; 90°C where allowed by termination ratings, and specifically rated for the location indicated on the Plans.

J. If any contradictions, contrasts, non-homogeneity, or inconsistency appears, the more strict criteria noted and the collective requirements in any and all of the project documents shall apply.

K. The Contractor shall perform necessary saw cutting, core drilling, excavating, removal, shoring, backfilling, and other work required for the proper installation of conduits, whether inside, or outside of the buildings and structures. The Contractor shall repair and patch where demolition has taken place in a manner to match existing original structure.

L. Conduit routing is shown diagrammatically. Contractor shall furnish and install all materials and labor consistent with field conditions to provide a complete and operating electrical system. Materials and conduit installation from utility service to the station connection shall be in accordance with the serving utility standards. All other materials shall be as specified in the contract documents.

1. This installation includes equipment, devices and materials that may require assistance of the manufacturer in its installation and operation.

2. Employing either directly or through its sub-contractor, manufacturer’s assistance during installation and start-up as may be necessary for the project’s successful operation as determined by the Owner at the completion of the services.

M. Substitutions of equipment and materials for that specified shall not be made without expressed approval of the Engineer. Such submission and review must occur prior to the

purchase.

N. Concrete, excavation, backfill, and steel reinforcement required for support, installation, or construction of the WORK of the various sections of Division 26 is included as a part of the WORK including underground conduit, pull boxes, vaults, and equipment.

O. Equipment, apparatus, bus and devices installed within enclosures shall be securely anchored in place and be capable of withstanding seismic forces per the 2022 California Building Code.

1.4 REGULATIONS, CODES, AND STANDARDS

A. Electrical work, including connection to electrical equipment integral with mechanical equipment, shall be performed in accordance with the latest published regulations, codes, and standards, of the following:

1. National Electric Code (NEC)
2. State and local codes
3. Institute of Electrical and Electronics Engineers (IEEE)
4. American National Standards Institute (ANSI)
5. America Society for Testing and Materials (ASTM)
6. Insulated Cable Engineers Association (ICEA)
7. National Electrical Manufacturers Association (NEMA) Standards
8. Federal Occupational Safety and Health Act (OSHA)
9. National Fire Protection Association (NFPA)
10. InterNational Electrical Testing Association (NETA)
11. California Code of Regulations (CCR)
12. Public Utilities Commission, State of California: Rules for Overhead Electric Line Construction, General Order #95. (GO95)
13. (GO128) Public Utilities Commission, State of California; Construction of Underground Electric Supply and Communication Systems, General Order #128.
14. (CBC) California Building Code, 2022 Edition
15. (OSHA) Safety and Health Standards – 29 CFR 1910 and 29 CFR 1926

B. When applicable, the material used in the performance of the electrical work shall be listed by the Underwriters' Laboratories, Inc. (UL) for the class of service for which they are intended.

C. Where the requirements of the specifications conflict with IEEE, UL, NEMA, NFPA, ICEA, ANSI, NETA, ASTM or other applicable standards, the more stringent requirements shall govern.

1.5 SUBMITTALS

A. It is the obligation of the Contractor to organize their work, so that a complete electrical, instrumentation, and control system for the facility will be provided, and will be supported by accurate shop and record drawings, all in electronic Portable Document Format (PDF).

B. The Contractor shall submit detailed shop drawings and data prepared and organized by the suppliers in PDF of fabricated equipment at time of completion of factory engineering. In addition to a display of the equipment fabrication, the shop drawings shall include the electrical characteristics of all equipment and devices, weight, guaranteed dimensions, drawing numbers and project number. One set of AutoCAD files of all physical and schematic drawings shall be sent at time of shipment.

C. The submittals shall be neatly grouped and organized by specification section number, and sub-section. Related information shall be highlighted, and the specific product shall be marked. All submittals shall be complete, and presented in one package. Incomplete submittals will be returned without review. If a portion of the project requires a fast track schedule, that portion only may be submitted earlier under a separate cover letter. The following shall be submitted to the Engineer and returned, reviewed to the Contractor before fabrication is started.

1. A complete list of the equipment and materials, including the manufacturer's name, product specification, descriptive data, technical literature, performance charts, catalog cuts, installation instructions, and spare part recommendations for each different item of the equipment specified. The above shall clearly show all the specified requirements as described in the Specifications including but not limited to specific U.L. and NEMA rating, technical capabilities, test result verifications, and acceptance letters.

2. Drawings containing complete point to point wiring and schematic diagrams, control diagrams, and any other details required to demonstrate that the system has been coordinated and will operate as intended. Drawings for each panel, cabinet, or enclosure shall show a complete Bill of Materials, wire numbers for internal panel and field wiring, terminal block numbers, proposed internal layout with assembly details, anchoring, support, and appurtenances of equipment, and equipment relationship to other parts of the work including clearances for maintenance and operations.

    a. Interconnection Diagrams will be prepared by the Contractor for all physically separate devices and equipment that require field wiring. The contract Interconnection Diagrams will be prepared using the information contained in the Contactor’s submittals. Interconnection Diagrams will show the termination of both ends of each known wire to be installed along with the wire designation. The Contractor shall correct or add any connections, designations and information needed to produce as-built diagrams. The marked-up Interconnection Diagrams shall be submitted for Engineer’s review after completion of the testing.

3. Catalog data sheets of all equipment, materials and devices. The catalog cuts shall include the identification of the Manufacturer and the specific Catalog Number of that which is intended to be used in the installation. Submittals not designating specific catalog numbers, ratings and features will be rejected without review.

4. Any exceptions to these specifications, with the reasons for requesting such exceptions, with calculations and drawings for redesign of related components,

including detail drawings showing internal and assembly details, with installation instructions. Proposed layout showing any modifications or exceptions to related work made necessary by this work, with calculations and drawings showing such modifications or exceptions.

D. The Contractor shall prepare and submit Operation and Maintenance Manuals for the site in PDF format through a file hosting service or email. Each volume shall contain the Manufacturer's Catalog Cut Sheet indicating the exact model number installed, the Manufacturer's User Manual, Installation Manual and Maintenance Manual including Safety documents if published and programming manuals if applicable. Scanned copies are not acceptable. All documents except for software and firmware shall be in Word, Excel or PDF format. Picture format is not acceptable. In addition, the manuals shall include the specific catalog numbers of the devices and equipment installed either listed separately or highlighted in the text of the documents.

E. Upon Project acceptance, the Contractor shall submit "Record Drawings" of the electrical, control, and instrumentation, along with step-by-step procedure manuals for the installation, operation start-up, and maintenance of the equipment. Each set shall include installation, operating, troubleshooting, and maintenance and overhaul instructions in complete detail. It shall also include possible breakdowns and repairs, and troubleshooting guides, as well as simplified wiring and control diagrams of the system installed. This shall provide the owner with comprehensive information on all systems and components to enable operation, service, maintenance and repair. Exploded or other detailed views of all equipment, devices, assemblies, and accessory components shall be included, together with complete parts lists and ordering instructions.

1. Record Drawings
    a. The Contractor shall maintain a marked up set of Contract Document Plans showing actual installed circuit numbers, conduit sizes, cable tray routing, number of conductors, conductor sizes (larger than #12 AWG), and all other deviations from the design Plans.
    b. Underground conduit and concealed items shall be dimensioned on the Plans from permanent, visible, building features.
    c. The Contractor shall provide actual motor size, starter size, and overload heater size, along with all other protective equipment for all 480 V and 4160 V motor circuits as part of the one-line record drawings.
    d. The Contractor shall revise all conductor identification and panel schedules to indicate asbuilt conditions.

1.6 PROSECUTION AND PROGRESS OF THE WORK

A. The Contractor shall be responsible for planning, scheduling, and reporting the progress of the work so as to ensure timely completion of the work called for in the contract. The Contractor shall prepare and submit a detailed schedule.

B. The Contractor shall notify Underground Service Alert (USA) and Inspector five (5) working days in advance of performing excavation work.

1.7 REPAIR OF EXISITING FACILITIES

A. The Contractor will be working on and around facilities constructed and installed by others. Existing facilities shall be repaired and incorporated in the final project feature as shown on the drawings and as specified in the technical specifications.

B. The Contractor shall take care not to damage or deface any of the existing work. IHS and/or the Owner will hold the contractor responsible both in repair and costs associated with such damage. The Contractor shall bear the total costs related such repairs. Repairs will include the restoration of existing surfaces to original appearance.

1.9 TEMPORARY ELECTRICAL POWER

A. The Contractor shall make arrangements for and pay for any electrical facilities and energy needed to accomplish their work at all construction sites.

B. The Contractor shall remove their construction electrical equipment consistent with the installation of the permanent power supply in a timely manner to allow for testing and startup of the facilities.

1.10 DRAWINGS

A. Prior to bidding, the Contractor shall inspect all conditions at the sites to their satisfaction.

B. Prior to performing the work, the Contractor shall verify all measurements to insure adequate space for installation of new equipment.

C. Conduit routing, as shown on the drawings, is diagrammatic. Routing, with prior approval of the Owner or IHS, may be adjusted to meet the electrical, structural and site conditions. Pullboxes shall be installed where required by Code whether shown or not.

D. All conduit and equipment shall be installed in a manner and in locations to preserve clearances and keeping all openings clear.

E. The contract drawings are essentially diagrammatic to the extent that offsets, bends, pullboxes, conduits, special fittings and the exact locations may not be completely indicated. The Contractor shall carefully study the drawings and premises in order to determine the best methods, exact locations, routes, noting obstructions, etc., and furnish and install all conduit and equipment in available locations and as required by conditions found at the site and the equipment being furnished. Pullboxes or vaults shall not be installed in traffic areas without the approval of the Owner and/or IHS.

F. The contract drawings show equipment locations, dimensions and anchorage that may not be accurate for the final manufactured product. In this regard, it is the responsibility of the Contractor to coordinate dimensions between the site work and the equipment supply, keeping records of the changes for preparation of the as-built drawings.

G. The dimensions shown for equipment are approximate and will be determined by the manufacturer. The Contractor shall locate equipment as close to the position shown without encroaching upon clearances for (1) access into the equipment, (2) working space and (3) accessibility all according to the California Electrical Code and the National Electric Code.

In addition, the Contractor shall confirm equipment dimensions with the manufacturer prior to placement of underground and/or buried conduits so that the conduits entering the base of the equipment are (1) located in the position as shown and (2) the blockouts in the building floor (as needed). Contractor shall coordinate this location with the equipment supplier and the building contractor. This requires a coordinated effort between the equipment supplier and the control building supplier (contractor).

1.11 CONSTRUCTIOIN PROGRESS NOTIFICATION

A. The Contractor shall provide written notification to Owner one week prior to the start of the following construction events.

1. Installation of underground work. Obtain Owner's approval prior to backfill. Owner may direct uncovering of any Work not so approved.

2. Placement of equipment foundations, slabs and pullboxes.

3. Installation of the grounding mat.

4. Start of wire pulling.

5. Scheduled start date for both electrical acceptance tests and startup testing.

1.12 ELECTRICAL WORK CLOSEOUT

A. Prepare the following items and submit to Owner/IHS via email or file hosting service before final acceptance.

1. One original copy of the marked-up Interconnection Diagrams.

2. Place all operating devices in the position and state of operation as directed by IHS.

3. PDF copy of all test results as required under this section. Test results to include a copy of the final settings of all motor controllers.

4. PDF copy of as-built record drawings.

5. PDF copy of all receipts transferring portable or detachable parts to the Owner when requested.

6. Copy of the Operation and Maintenance Manuals or PDF format.

7. Notify IHS in writing when installation is complete and that a final inspection of this work can be performed. In the event defects or deficiencies are found during this final inspection they shall be corrected to the satisfaction of IHS before final acceptance can be issued.

1.13 SCRAPPED, SALVAGED, DEMOLISHED MATERIALS AND EQUIPMENT

A. Contractor shall coordinate with IHS all materials and equipment which are demolished or scrapped prior to disposal. All removed materials and equipment which in opinion of the Owner are salvageable, shall remain the property of Owner. Deliver such salvaged materials and equipment on the premises. Salvaged materials shall be packed in sealed heavy cardboard storage boxes. All other items shall be removed from the facility and disposed of by the Contractor

B. Do not reuse salvaged materials and equipment, unless specifically indicated on plans or specified.

C. All costs associated with the work to remove and dispose shall be included in the Contractor's bid price.

PART - 2 PRODUCTS

2.1 SPECIFIC EQUIPMENT MODELS

A. Where manufacturer's specific model numbers are specified or shown with “or equal”, these indicate acceptable types. Where a manufacturer's specific model number is specified or shown, only that item will be acceptable. Modify model to comply with all requirements, as specified or shown. All similar equipment shall be of the same manufacturer.

2.2 GENERAL MATERIALS AND METHODS

1. Materials, equipment, and parts comprising any unit, or part thereof, specified or indicated on the Plans, shall be new and unused, of current manufacture, and of highest grade consistent with the state of the art. Damaged materials, equipment, and parts, are not considered to be new and unused, and will not be accepted.
2. Field verification of scale dimensions on Plans is directed, since actual locations, distances, and levels will be governed by actual field conditions. The CONTRACTOR shall also review architectural, structural, yard, mechanical, and other Plans, and the accepted electrical and mechanical shop drawings, and shall adjust their work to conform to the conditions indicated therein.
3. The fabricator of major components, such as distribution panelboards, switchgear, and motor control centers, shall also be the manufacturer of the major devices therein.
4. Refer to various Division sections for individual equipment manufacturers. Indicated manufacturers are subject to strict compliance with the specifications and complete project documents. The reference to a particular manufacturer does not

relieve the Contractor from conforming to the specified requirements.

2.3 NAMEPLATES

1. Where indicated elsewhere in these specifications, or on the Plans, the Contractor shall furnish and install nameplates fastened to the various devices with round head stainless steel screws. Each disconnecting means for service, feeder, branch, or equipment conductor, shall have nameplates indicating its purpose.

2. Indoor: Laminated phenolic plastic, black front and back, white core, with lettering etched through outer covering. Use 1/4" high lettering at push button stations, thermal overload switches, receptacles, switches, and similar devices, where nameplate is attached to device plate. Use 1/4" high lettering at all other locations, unless otherwise specified or detailed.

3. Outdoor: Engraved or embossed stainless steel.

2.4 EQUIPMENT ASSEMBLIES

1. Equipment assemblies, such as Service Entrance Sections, Switchgear, Switchboards, Control and Distribution Panels, and other custom fabricated electrical enclosures shall bear a UL label as a complete assembly. The UL label on the individual components making up the assembly will not be considered sufficient to meet the present requirement. Whenever a generic UL label does not apply for the assembly, a serialized UL label shall be affixed to the assembly, and the serial number shall be submitted with the assembly record shop drawings.

2. Custom fabricated electrical control panels, and enclosures, shall bear a UL label affixed by a local UL inspector.

2.5 SPARE PARTS

1. Spare parts as specified in each Division 26 00 00 specification section shall be furnished by the Contractor. The cost of the spare parts shall be included in the Contractor's bid price. Spare parts shall be packaged for storage, shall be clearly labeled on the outside of the package, and shall be grouped for their respective equipment. Any spare parts used by the Contractor during the start-up or warranty period shall be replaced by the Contractor at no additional cost to the Owner.

2.6 SEISMIC REQUIREMENTS

1. Equipment, apparatus, bus and devices installed within enclosures shall be securely anchored in place and be capable of withstanding seismic forces per the 2019 California Building Code. For Contractor supplied equipment, the Contractor shall submit actual tests of similar equipment showing compliance. A California Seismic Certificate shall be prepared and signed by authorized company representative. Where the product is not standard equipment, submit calculations showing compliance and stamped by a registered structural engineer with current

registration in California.

PART - 3 EXECUTION

3.1 INSTALLATION OF ELECTRICAL EQUIPMENT

A. Verify that equipment will fit support layouts indicated.
B. Equipment Dimensions and Clearances:
    1. Do not use equipment that exceeds the indicated dimensions, except as approved in writing by the Engineer.
    2. Do not used equipment or arrangements of equipment that reduce required clearances or exceed the space allocation.
C. Install equipment in accordance with manufacturer's instructions.
D. Equipment Access:
    1. Install equipment so it is readily accessible for operation and maintenance.
    2. Equipment should not be blocked or concealed.
    3. Do not install electrical equipment such that it interferes with normal maintenance requirements of other equipment.
E. Equipment shall in installed plumb, square and true with the building construction, and shall be securely fastened.
F. Outdoor wall-mounted equipment, and indoor equipment mounted on earth, or water bearing walls, shall be provided with corrosion-resistant spacers to maintain ¼ inch separation between the equipment and the wall.
G. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.
H. Equipment fabricated from aluminum shall not be imbedded in earth or concrete.
I. Provide all necessary anchoring devices and supports:
    1. Use supports as detailed on the Plans and as specified.
    2. Supports and anchoring devices shall be rated and sized based on dimensions and weights verified from approved equipment submittals.
    3. Hardware shall be stainless steel.
    4. Do not cut, or weld to, building structural members.
    5. Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
J. Contractor shall verify exact rough-in location and dimensions for connection to electrical items furnished by others.
    1. Shop drawings shall be obtained from those furnishing the equipment.
    2. Proceeding without proper information may require the Contractor to remove and replace work that does not meet the conditions imposed by the equipment supplied.
    3. Provide sleeves wherever openings are required through new concrete or masonry members. Place sleeves accurately and coordinate locations with the Engineer.
    4. Should any cutting and patching be required on account of failure of the Contractor to coordinate penetrations, such cutting and patching shall be done at the expense of the Contractor.

a. The Contractor shall not endanger the stability of any structural member by cutting, digging, chasing, or drilling and shall not, at any time, cut or alter the work without the Engineer's written consent.
1) Provide additional reinforcing if required.
2) Cutting shall be done neatly using proper tools and methods

b. Subsequent patching to restore walls, ceilings, or floors to their original condition shall be done by the Contractor.

K. Provide concrete foundations or pads required for electrical equipment as indicated or specified.
1. Floor-mounted equipment shall be mounted on a 4-inch concrete housekeeping pad. Pad shall be poured on top of the finished floor or slab.

3.2 TEMPORARY POWER (IF NEEDED)

A. The Contractor shall furnish, install, and maintain, temporary power and lighting systems needed for construction. This temporary system shall include weatherproof panel(s) for the Contractor's main breakers and distribution system. Ground fault interrupting equipment shall be installed. Connections shall be watertight, with wiring done with Type SO portable cable. After construction is completed, the Contractor shall remove temporary power equipment and devices.

3.3 CUTTING AND REPAIRING

A. Where it becomes necessary to cut into existing work for the purpose of making electrical installations, core drills shall be used for making circular holes. Other demolition methods for cutting or removing shall be reviewed by the Engineer prior to starting the work.

B. The Contractor shall repair damage caused by construction, or demolition work, and restore damaged areas to original condition.

3.4 CORROSION PROTECTION

A. Wherever dissimilar metals, except conduit and conduit fittings, come in contact, the Contractor shall isolate these metals, as required, with neoprene washers, 9 mil polyethylene tape, or gaskets. Where fastening conduit, electro plated, or equivalent fasteners and stainless steel bolts shall be used.

B. Factory finishes damaged during shipping, or construction, shall be restored to original new condition. Rust shall be removed, and bare metal surfaces shall be primed and painted to match the original surrounding finish.

C. Electrical equipment, shall be shipped in sealed dust and moisture proof plastic sheet enclosures, and the seal maintained until units are installed. Said units shall be new and free of any dirt, dust, water, grease, rust, damaged parts or components. Relays, starters, circuit breakers, switches, contacts, insulators, mechanisms, and buses shall be free of dust, dirt, oil, moisture, metal shavings, and other debris before testing and energizing.

D. Once equipment is installed, it shall be protected at all times with plastic sheet covers until the area is free of dirt, dust, paint spray, water, and other trades. Heat shall be provided to eliminate condensation.

3.5 COORDINATION OF THE ELECTRICAL SYSTEM

A. The Contractor shall verify actual equipment, and motor full-load, and locked-rotor current ratings. The necessary minimum equipment, wire, and conduit sizes are indicated on the Plans. If the Contractor furnishes equipment of different ratings, the Contractor shall coordinate the actual current rating of equipment furnished with the branch circuit conductor size, the overcurrent protection, the controller size, the motor starter, and the branch circuit overcurrent protection. The branch circuit conductors shall have a current carrying capacity of not less than 125 percent of the actual full-load current rating. The size of the branch circuit conductors shall be such that the voltage drop from the overcurrent protection devices, up to the equipment, shall not exceed 2 percent, when the equipment is running at full-load and rated voltage

3.6 TESTING AND PREPARATION FOR OPERATION

A. The electrical work shall be free from improper grounds, and from short circuits. The correctness of the wiring shall be verified first by visual comparison of the conductor connections with connection diagrams. Next, individual circuit continuity checks shall be made by using electrical circuit testers. Last, the correctness of the wiring shall be verified by the actual electrical operation of the electrical and mechanical devices. Any deviation from the wiring indicated on the Plans, or accepted Drawings, shall be corrected and indicated on the record drawings.

B. The electrical installation shall be in accordance with the applicable standards specified hereinbefore unless otherwise specified herein. The Contractor shall place the equipment accurately in position, level the equipment, assemble all equipment which requires assembling, including bus and internal wire connections where required, connect all incoming wires properly, and adjust and make ready for service the electrical equipment and material required by these Specifications or as shown on the Drawings. After all work is complete, the Contractor shall clean each piece of equipment and leave the project work area in a clean condition to the satisfaction of IHS. All work shall be done in an orderly and skillful manner and shall present a neat appearance when completed.

C. All equipment installed by the Contractor shall be in accordance with the Drawings and the manufacturer's recommendations and shall operate to Owner’s satisfaction. The Contractor shall be responsible for, and shall correct by repair or replacement, at their own expense, equipment that, in the opinion of Owner has been caused by faulty mechanical or electrical assembly. Necessary tests to demonstrate that the electrical and mechanical operation of the equipment is satisfactory and meets the requirements of these Specifications shall be made by the Contractor at no additional cost to the Owner.

D. Owner reserves the right to require changes in equipment location without incurring additional costs. The equipment dimensions and locations shown on the Drawings are approximate and subject to change when the actual equipment dimensions are known.

E. Shipping and Storage: Equipment, regardless of whether it is to be installed immediately

or stored for some time before installation, shall be kept in a clean dry place. Heaters installed in equipment to prevent formation of moisture shall be energized. Blocks and wires used to hold moving parts in position during shipping and handling shall remain in place until the equipment has been completely removed. The equipment shall be moved by means of lifting eyes, jacking pads, or other means provided by the manufacturer for that purpose.

F. Equipment shall not be set in place until all construction work which might damage the equipment has been completed, and it shall be protected by means of tarpaulins as long as work is being done in the area where the equipment is located.

G. Marking

1. Mark conduit at intervals not exceeding 10 feet with Fasttags by Tech Products or approved equal. Free-hand lettering is not acceptable.
2. Fasten nameplates securely to equipment with stainless steel #4 Phillips round head, self-tapping screws, or nickel-plated brass bolts.
3. Identification shall be indicated on the record drawings to enable rapid and accurate circuit tracing my maintenance personnel.

H. Testing and preparation for operation shall be performed in accordance with Section 26 01 26, titled MAINTENANCE TESTING OF ELECTRICAL SYSTEMS.

3.7 SINGLE LINE DIAGRAMS (NOT USED)

A. Single line diagrams, as indicated on the Drawings, show circuit voltages, circuit protection rating, and other pertinent data. Where conflicts exist on the Drawings, the single line diagrams shall take precedence. Grounding conductors are not necessarily indicated. See grounding requirements specified elsewhere herein.

3.8 WARRANTY

A. Equipment, materials and installation shall be guaranteed for a period of one year after the date of acceptance of the work by IHS unless otherwise specified. Repair or remove and replace any and all work that is found to be defective in workmanship and/or materials within said one year period, without expense whatsoever to the Owner. The Contractor shall respond to repairs within 48 hours after notice from the Owner.

B. Warranties, Guarantees, Certificates, etc., furnished or available to equipment and material under this Division, shall be promptly filled out as of date of acceptance and delivered to the Owner.

END OF SECTION

SECTION 26 01 26

MAINTENANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall provide testing as specified herein.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American Society for Testing and Materials (ASTM)
   2. Institute of Electrical and Electronics Engineers (IEEE)
   3. National Electrical Manufacturers Association (NEMA)
   4. InterNational Electrical Testing Association (NETA)
   5. National Fire Protection Association (NFPA)

1.3 SUBMITTALS

A. Products shall be submitted for review in accordance with the Contract Documents

B. Administrative Submittals: Submit 30 days prior to performing inspections or tests:
   1. Schedule for performing inspection and tests
      a. Include notification dates for special inspections.
   2. List of references to be used for each test.
   3. Sample copy of equipment and materials inspection form(s).
   4. Sample copy of individual device test form.
   5. Sample copy of individual system test form.

C. Quality Control Submittals: Submit within 14 days after completion of test:
   1. Test of inspection reports and certifications for each electrical item tested.

D. Contract Closeout Submittal:
   1. In accordance with Operation & Maintenance requirements specified elsewhere.
   2. After test of inspection reports and certificates have been reviewed by the Engineer and returned, insert a copy of each in operation and maintenance manual.

1.4 QUALITY ASSURANCE

A. Test equipment shall have an operating accuracy equal to, or greater than, requirements established by NETA ATS (Acceptance Testing Specifications). Test instrument calibration shall be in accordance with NETA ATS.

1.5 SEQUENCING AND SCHEDULING

A. Perform inspection and electrical tests after equipment has been installed and certified by equipment manufacturer's representative.

B. Perform tests with apparatus de-energized whenever feasible.

C. Inspection and electrical tests on energized equipment are to be:
   1. Scheduled with Owner and Engineer prior to de-energization.
   2. Minimized to avoid extended period of interruption to the operating equipment.

D. Notify Owner and Engineer at least 72 hours prior to performing tests on energized electrical equipment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Tests specified in this section are to be performed in accordance with the requirements of manufacturer's minimum recommendations, as identified herein, and as detailed in specific equipment specifications.

B. Tests and inspection shall establish that:
   1. Electrical equipment is operational within industry and manufacturer's tolerances.
   2. Installation operates as designed and intended by the equipment manufacturer.
   3. Equipment is suitable for energization.
   4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, and IEEE C2.

C. Perform inspection and testing in accordance with NETA ATS, industry standards, and manufacturer's recommendations.

D. Adjust mechanisms and moving parts for free mechanical movement.

E. Adjust adjustable relays and sensors to correspond to operating conditions, or as recommended by manufacturer.

F. Verify nameplate data for conformance to Contract Documents.

G. Realign and shim any improperly aligned equipment to a plumb, level, and square condition.

H. Properly anchor electrical equipment found to be inadequately anchored.

I. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench to manufacturer's recommendations, or as otherwise specified.

J. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.

K. Provide proper lubrication to applicable moving parts.

L. Inform OWNER of working clearances not in accordance with NFPA 70.

M. Investigate and repair or replace:
1. Electrical items that fail tests.

2. Active components not operating in accordance with manufacturer's instructions.

3. Damaged electrical equipment.

3.2 ELECTRICAL ENCLOSURES:

A. Remove foreign material and moisture from enclosure interior.

B. Vacuum and wipe clean enclosure interior.

C. Remove corrosion found on metal surfaces.

D. Repair or replace, as determined by OWNER, door and panel sections having dented surfaces.

E. Repair or replace, as determined by OWNER, poor fitting doors and panel sections.

F. Repair or replace improperly operating latching, locking, or interlocking devices.

G. Replace missing or damaged hardware.

H. Finish:
1. Provide matching paint and touch up scratches and blemishes.
2. If required due to extensive damage, as determined by OWNER, refinish the entire assembly.

I. Replace fuses and circuit breakers that do not conform to size and type required by the Contract Documents.

J. Grout, caulk, or seal around the base of enclosures to prevent the entrance of moisture, dust, and rodents.

3.3 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspections
1. Inspect each individual exposed power cable No. 4 AWG and larger for:

a. Physical damage.
b. Proper connections in accordance with Single-Line Diagram.
c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
d. Color coding conformance with NFPA 70 or specifications.
e. Proper circuit identification.

2. Mechanical Connections for:
   a. Proper lug type for conductor material.
   b. Proper lug installation.
   c. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
3. Shielded Instrumentation Cables (IC) for:
   a. Proper shield grounding.
   b. Proper terminations.
   c. Proper circuit identification.
4. Control Cables for:
   a. Proper termination.
   b. Proper circuit identification.
5. Cables Terminated Through Window Type CTs: Verify that neutrals and grounds are terminated for correct operation of protective devices.

B. Electrical Tests:
1. Insulation Resistance Tests:
   a. Applied megohmmeter DC voltage in accordance with NETA ATS, Table 100.1.
   b. Phase-to-phase and phase-to-ground for 1 minute on each pole.
   c. Insulation resistance values equal to, or greater than ohmic values established by manufacturer or listed in NETA ATS, Table 100.1.
2. Contact Resistance Tests:
   a. Contact resistance in microhms across each switch blade and fuse holder, 30 amps and larger.
   b. Investigate deviation of 50 percent or more from adjacent poles or similar switches.

3.4 INSTRUMENT TRANSFORMERS

A. Visual and Mechanical Inspection:
1. 1. Visually Check Current, Potential, and Control Transformers for:
   a. Cracked insulation.
   b. Broken leads or defective wiring.
   c. Proper connections
   d. Adequate clearances between primary and secondary circuit wiring.
2. Verify Mechanically that:
   a. Grounding and bonding connections have good contact.
   b. Withdrawal mechanism and grounding operation, when applicable, operate properly.
3. Insulation resistance measurement on instrument transformer shall not be less than that shown in NETA ATS, Table 100.5.

3.5 METERING

A. Visual and Mechanical Inspection:
   1. Verify meter connections in accordance with appropriate diagrams.
   2. Verify meter multipliers.
   3. Verify that meter types and scales conform to Contract Documents.
   4. Check calibration of meters at cardinal points.
   5. Check calibration of electrical transducers.

3.6 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:
   1. Equipment and circuit grounds in motor control centers and panelboards assemblies for proper connection and tightness.
   2. Ground bus connections in motor control centers and panelboards assemblies for proper termination and tightness.
   3. Effective transformer core and equipment grounding.
   4. Accessible connections to grounding electrodes for proper fit and tightness.
   5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

3.7 MOTOR CONTROL CENTERS/PANELS AND MOTOR CONTROLLERS

A. Visual and Mechanical Inspection:
   1. Proper barrier and shutter installation and operation.
   2. Proper operation of indicating and monitoring devices.
   3. Proper overload protection for each motor.
   4. Improper blockage of air cooling passages.
   5. Proper operation of drawout elements.
   6. Integrity and contamination of insulation system.
   7. Check door and device interlocking system by:
      a. Closure attempt of device when door is in OFF or OPEN position.
      b. Opening attempt of door when device is in ON or CLOSED position.
   8. Check nameplates for proper identification of:
      a. Equipment title and tag number with latest Single-Line Diagram.
      b. Pushbuttons.
      c. Control switches.
      d. Pilot lights.
      e. Control relays.
      f. Circuit breakers.
      g. Indicating meters.
   9. Verify that fuse and circuit breaker sizes and types conform to Contract Documents.
   10. Verify that current and potential transformer ratios conform to Contract Documents.
   11. Check bus connections for high resistance by low resistance ohmmeter and calibrated torque wrench applied to bolted joints:
      a. Ohmic value to be zero.

b. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified By manufacturer.

12. Check operation and sequencing of electrical and mechanical interlock systems by:
    a. Closure attempt for locked open devices.
    b. Opening attempt for locked closed devices.
13. Verify performance of each control device and feature furnished as part of the motor control center or motor controller.
14. Control Wiring:
    a. Compare wiring to local and remote control, and protective devices with elementary diagrams.
    b. Check for proper conductor lacing and bundling.
    c. Check for proper conductor identification.
    d. Check for proper conductor lugs and connections.
15. Exercise active components.
16. Inspect contactors for:
    a. Correct mechanical operations.
    b. Correct contact gap, wipe, alignment, and pressure.
    c. Correct torque of all connections.
17. Compare overload rating with full-load current for proper size.
18. Compare fuse, motor protector, and circuit breaker with motor characteristics for proper size.
19. Perform phasing check on double-ended motor control centers to ensure proper bus phasing from each source.

B. Electrical Tests:
1. Insulation Resistance Tests:
    a. Applied megohmmeter DC voltage in accordance with NETA ATS, Table 100.1.
    b. Bus section phase-to-phase and phase-to-ground for 1 minute on each phase.
    c. Contactor phase-to-ground and across open contacts for 1 minute on each phase.
    d. Starter section phase-to-phase and phase-to-ground on each phase with starter contacts closed and protective devices open.
    e. Test values to comply with NETA ATS, Table 100.1.
2. Overpotential Tests:
    a. Maximum applied AC or DC voltage in accordance with manufacturer's published values. If not available, in accordance with NETA ATS, Table 100.19.
    b. Phase-to-phase and phase-to-ground for 1 minute for each phase of each bus section.
    c. Test results evaluated on pass/fail basis.
3. Current Injection Through Overload Unit at 300 Percent of Motor Full-Load Current and Monitor Trip Time:
    a. Trip time in accordance with manufacturer's published data.
    b. Investigate values in excess of 120 seconds.
4. Control Wiring Tests:
    a. Apply secondary voltage to control power and potential circuits.
    b. Check voltage levels at each point on terminal boards and each device terminal.
    c. Insulation resistance test at 1,000 volts DC on control wiring except that connected to solid state components.
        1) Insulation resistance to be 1 megohm minimum.

5. Operational test by initiating control devices to affect proper operation.

3.8 LOW VOLTAGE SURGE ARRESTORS

A. Visual and Mechanical Inspection:
   1. Adequate clearances between arrestors and enclosures.
   2. Ground connections to ground bus.

B. Electrical Tests:
   1. Varistor Type Arrestors:
      a. Clamping voltage test.
      b. Rated RMS voltage test.
      c. Rated do voltage test.
      d. Varistor arrester test values in accordance with IEEE C62.33, Sections 4.4 and 4.7.

3.9 PRE-OPERATIONAL TESTING

A. Prior to energizing, the Contractor shall have the following tests completed and the results recorded on the Form stated. It is the intent of these tests to assure that all equipment is installed within industry and manufacturer's tolerances and in accordance with design plans and specifications and is operational. These tests and inspections shall determine the suitability for energization.

B. All tests required to ensure the satisfactory installation, adjustment, operation and performance of all design and materials erected and installed and to prove installation is in accordance with this Specification.

C. The Contractor shall provide all material, labor, testing equipment, tools and technical supervision required.

D. Work shall be performed in a careful and safe manner so as not to endanger personnel or equipment.

E. All testing shall conform to International Electrical Testing Association (NETA) Maintenance and Acceptance specifications and shall utilize manufacturer's instruction manuals applicable to each particular apparatus.

F. Upon completion of the test and inspections noted in these specifications, a label shall be attached to all serviced devices. These labels will indicate date serviced and the company responsible.

G. The following tests shall be completed prior to connection of cables. The Contractor shall notify IHS two working days prior to making the tests. The Contractor shall complete the subject forms prior to submission to IHS.
   1. Conductor Insulation Resistance

3.10 OPERATIONAL TESTS

A. General Requirements
   1. It is the intent of these tests to assure that all equipment is operational and installed in accordance with the design plans and specifications. Operational tests will determine the suitability for IHS acceptance of the Contractor's work and will be made after pre-operational testing and trial operations are complete.

B. Operation Demonstration

The entire electrical and control system installation shall be operated to verify contract compliance. Contractor shall conduct operational demonstrations in the presence of IHS and Operations and Maintenance personnel. IHS and Operations and Maintenance personnel will assist the Contractor during Operational Demonstration. The Contractor shall give IHS minimum 5-day notice of the dates and times for inspections and operational testing.

The Contractor shall operate each site for normal operation to the satisfaction of Owner. Owner may waive this test at their discretion and convenience. The Contractor shall provide all material and labor and perform the tests in the presence of the IHS representative.

Demonstration of the operability of segments of systems shall not be construed as acceptability of the complete system. Acceptance will only be made on satisfactory demonstration of the operability of the system as a whole.

3.11 FAILURE TO MEET INSPECTION AND TESTS

A. If, in the opinion of Owner, the operational demonstration results show improper adjustment, operation, or performance of any equipment, and these deficiencies are due to (1) factory manufacturing issues, and or (2) negligence or unsatisfactory installation by the Contractor, the Contractor shall remedy the situation at no additional cost to Owner.

B. Any system material or workmanship that is found defective by the Contractor shall be reported to IHS. Contractor shall replace the defective material or equipment and have inspection and tests repeated until test proves satisfactory to IHS. All work in connection with the failure, replacement and tests shall be done without additional cost to Owner.

3.12 FINAL ADJUSTMENT, CLEANING AND TRAINING

A. Clean all equipment.

B. Replace filters of operating equipment.

C. Make final adjustments under the supervision of IHS.

D. Provide not less than four hours of instruction to IHS and Tribal personnel.

3.13 GUARANTEE

Except as otherwise stated, the Contractor shall guarantee all equipment and material furnished under these specifications from any defective material or workmanship. Contractor shall repair or replace, as may be necessary, any defective work or material which may show itself within one (1) year of the date of the final payment, if in the opinion of Owner said defect is due to imperfections or workmanship or material.

END OF SECTION

SECTION 26 05 23

INSTRUMENTATION AND COMMUNICATION CABLES

PART - 1 GENERAL

1.1 DESCRIPTION

A. Scope:
   1. Provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install instrumentation and communication cables.

B. Related Sections:
   1. Section 26 05 33, Conduits and Boxes for Electrical Systems
   2. Section 26 05 53, Identification for Electrical Systems

1.2 REFERENCES

C. Standards referenced in this Section are listed below:
   1. ASTM A510/A510M, Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel and Alloy Steel.
   2. ASTM B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
   3. ANSI/TIA/EIA-568, Commercial Building Telecommunications Cabling (requirements and restrictions of Technical Service Bulletins (TSBs) apply.)
   4. RS-485, Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems (also known as TIA/EIA-485).
   5. UL 13, Power-Limited Circuit Cables.
   6. UL 1581, Standard for Electrical Wires, Cables and Flexible Cords.
   7. UL VW-1, Vertical Wire Flame Test.
   8. UL 1666, Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. NEC 725, Class 1, Class 2, and Class 3 Remote-Control, Signaling and Power-Limited Circuits.
   2. NEC 727, Instrumentation Tray Cable.
   3. NEC 800, Communications Circuits.

1.4 SUBMITTALS

A. Action submittals: Submit the following:
   1. Product Data: Manufacturer’s technical information for instrumentation cables and

communications cables proposed.

2. Provide pulling calculations for cables to be installed in the jack and bore ductbank.

B. Informational Submittals: Submit the following:

1. Field Quality Control Submittals: Written report of results of field quality control testing specified in this Section.

PART - 2 PRODUCTS

2.1 MATERIALS

A. Single and Multiple Shielded Pair Instrument Cable:

1. Bare, soft annealed copper, 7 strand, PVC insulated conductors, No. 18 AWG minimum (unless indicated otherwise on the drawings / conduit schedule), twisted with aluminum/mylar shield with 25 percent minimum overlap, stranded tinned 20 AWG copper drain wire and PVC outer jacket. Rated for 300 volts. Temperature rated 90-degrees C in dry installations, rated 75-degrees C in wet locations. UL Type TC, UL listed for cable tray use, sunlight resistant. The abbreviation “STP” is used for shielded twisted pair on the Drawings.
2. Product and Manufacturer: Provide shielded cable of the following:
   a. Alpha Wire Company.
   b. Or equal.
3. Cable shall be plenum rated when all or part of the cable is not encased in conduit.
4. Multi pair instrument cable shall have individual pair shielding and overall shielding.

B. Cable Terminals:

1. Manufacturers: Provide products of one of the following:
   a. T&B Sta-Kon.
   b. Burndy Insulug.
   c. Or equal.
2. Fork type copper compression terminals with nylon insulation for termination of cable at terminal blocks.

C. Single Shielded Triad Instrument Cable:

1. Bare, soft annealed copper, 7 strand, PVC insulated conductors, No. 16 AWG minimum, twisted with aluminum/mylar shield with 25 percent minimum overlap, stranded tinned 20 AWG copper drain wire and PVC outer jacket. Rated for 600 volts. Temperature rated 90- degrees C in dry installations, rated 75-degrees C in wet locations. UL Type TC, UL listed for cable tray use, sunlight resistant. The abbreviation “STT” is used for shielded twisted triad on the Drawings.
2. Product and Manufacturer: Provide shielded cable of the following:
   a. Alpha Wire Company.
   b. Or equal.
3. Cable shall be plenum rated when all or part of the cable is not encased in conduit.

D. Shielded Ethernet Category 5e Premises Cable:

1. This cabling is for outdoor applications, process control interface (VFDs, PLCs, etc.), lighting control component interconnections, and anywhere network cables will be routed in the same ductbank, manhole, handhole, or other raceway as AC power cabling.
2. Furnish, install and terminate from each field device to the network switch.
   a. Suitable Applications: Gigabit Ethernet, 100BaseTX, 100MHz Category 5e.
   b. Number of Pairs: 4.
   c. Total Number of Conductors: 8.
   d. AWG: 24
   e. Stranding: Solid.
   f. Conductor Material: Bare Copper.
   g. Color Code: EIA 568.
   h. Shield: Double-shielded version with 100% coverage aluminum foil tape plus tinned copper braid.
   i. Insulation Material: Polyolefin.
   j. Outer Jacket Material: PVC, outdoor rated, sunlight resistant, oil resistant.
   k. Outer Jacket Color: Blue.
   l. TIA/EIA Specification: 1005, 568B compliant.
   m. UL Flame Test: UL 1666 Riser compliant.
   n. Manufacturer: Belden, Model 7957A.
   o. Use shielded RJ45 strain relief plug systems by L-com (TDS8PC5) with plugboots (TDS8CVR-BK).

PART - 3 EXECUTION

3.1 INSPECTION

A. Examine conditions under which materials and equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:
   1. Install cables complete with proper terminations at both ends.
   2. Install in conduit separate from power cables, unless shown or indicated otherwise.
   3. Ground shield on shielded cables at the source end (PLC panel, etc.).
   4. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.
   5. Install and terminate Supplier-furnished cable in accordance with equipment manufacturer requirements and cable manufacturer's recommendations.
   6. Install in accordance with Laws and Regulations, including NEC.
   7. Furnish, install and terminate from each field device to the network switch.

3.3 FIELD QUALITY CONTROL

A. Site Tests:
   1. Test shielded instrumentation cable shields with ohmmeter for continuity along full length of

cables, and for shield continuity to ground.

2. Connect shielded instrumentation cables to calibrated 4 to 20 mA DC signal transmitter and receiver. Test at 4 and 20 mA DC transmitter settings.
3. Replace with new cables the full length of cables that fail test.
4. Test equipment shall be provided by Contractor.
5. Test all Ethernet cables with a Fluke DSP100 Cable Meter (or equal) testing system. Each cable shall be tested from the connected data jack, control panel, VFD, UPS, etc., to the patch panels. A qualified factory-trained manufacturer's representative shall certify in writing that the network cabling system has been installed, adjusted, and tested in accordance with the cable manufacturer's recommendations and industry standards for performance testing. Certification shall bear the typewritten name and signature of the person responsible for the work. Certification shall state the unit has passed all tests and is ready to be placed into operation. Provide four (4) copies of the manufacturer's representative's certification.

END OF SECTION

SECTION 26 05 29

SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Supports, anchors, sleeves, and seals, are indicated on the Plans, schedules, and specified in other sections of these Specifications.

B. Types of supports, anchors, sleeves and seals specified in this section include the following:
1. One-hole Conduit Straps
2. One-Hole Conduit Straps with Clamp Backs
3. Two-Hole Conduit Straps
4. Conduit Hangers
5. I-beam Clamps
6. Channel Clamps
7. Round Steel Rods
8. Drop-in Anchors
9. Wedge Type Anchor Bolts
10. Lead Expansion Anchors
11. Toggle Bolts
12. Wall and Floor Seals
13. Cable Supports
14. U-Channel Strut System
15. Sleeves

1.2 SUBMITTALS

A. Products shall be submitted in accordance with the Contract Documents prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following: Abbeon Cal Inc., Ackerman Johnson Fastening Systems Inc., Elcen Metal Products Co., Ideal Industries, Inc., Josyln Mfg and Supply Co., McGraw Edison Co., Rawlplug Co. Inc., Star Expansion Co., U.S. Expansion Bolt Co., Allied Tube and Conduit Corp., B-Line Systems, Inc., Greenfield Mfg Co., Inc., Midland-Ross Corp., OZlGedney Div; General Signal Corp., Power-Strut Div.; Van Huffel Tube Corp., and Unistrut Div; GTE Products Corp., and Robroy Industries.

2.2 GENERAL

A. Provide supporting devices that comply with manufacturers standard materials, design, and construction, in accordance with published product information, and as required for complete installations, and as specified herein.

2.3 SUPPORTS

A. Provide supporting devices of types, sizes, and materials indicated, and having the following construction features:
   1. One-Hole Conduit Straps: For supporting electrical metallic tubing, and liquidtight flexible conduit; zinc plated steel, stainless steel or galvanized steel; snap-on, heavy duty.
   2. One-Hole Conduit Straps with Clamp Backs: For supporting rigid metal conduit, and intermediate metal conduit; cast galvanized steel.
   3. Two-Hole Conduit Straps: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
   4. Conduit Hangers: For supporting electrical metallic tubing, rigid metal conduit, and intermediate metal conduit; zinc plated steel, stainless steel or galvanized steel.
   5. I-Beam Clamps: Electroplated zinc or hot dipped galvanized malleable iron.
   6. Channel Clamps: Electroplated zinc or hot dipped galvanized steel.
   7. Round Steel Rod: National coarse thread, electroplated.

2.02 ANCHORS

A. Provide anchors of types, sizes, and materials indicated, with the following construction features:
   1. Lead Expansion Anchors: For CMU walls, 114"-20 threads, set tool required.
   2. Toggle Bolts: Electroplated steel, size as required.
   3. Drop-in Anchors: Stainless steel, size as required.
   4. Anchor Bolts: Stainless steel, size as required.
   5. Half-round head, non-removable anchor bolts shall not be used.

2.03 SEALS

A. Provide seals of types, sizes and materials indicated; with the following construction features:
   1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of types and sized indicated; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
   2. Conduit sealing bushings shall be manufactured by O-Z/Gedney, Model CSMI, or equal.
   3. The conductor sealing bushings shall be manufactured by O-Z/Gedney, Model CSBG, or equal.

2.04 CONDUIT CABLE SUPPORTS

A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

2.05 U-CHANNEL STRUT SYSTEM

A. Provide U-channel strut system for supporting electrical equipment, 12-gage hot-dip galvanized steel, of types and sizes indicated; construct with 9/16" diameter holes, 8" O.C. on top surface, with the following fittings that mate and match with U-Channel:
   1. Fixture hangers
   2. Channel hangers
   3. End caps
   4. Beam clamps
   5. Wiring stud
   6. Thin wall conduit clamps
   7. Rigid conduit clamps
   8. Post Bases
   9. U-bolts

2.06 PIPE SLEEVES

A. Provide pipe sleeves from the following:
   1. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs

2.07 PVC COATED U-CHANNEL STRUT SYSTEM

A. Provide PVC Coated U-channel strut system for supporting electrical equipment, 20 mil PVC coated steel, of types and sizes indicated; construct with 9/16" diameter holes, 8" O.C. on top surface, with all Stainless Steel hardware, and the following fittings that mate and match with PVC Coated U-Channel:
   1. PVC Coated Strut nut
   2. PVC Coated Pipe straps
   3. Touch up compound (Gray)

2.08 STAINLESS STEEL U-CHANNEL STRUT SYSTEM

A. Provide Stainless Steel U-channel strut system for supporting electrical equipment, of types and sizes indicated; construct with 9/16" diameter holes, 8" O.C. on top surface, with all stainless steel hardware, and the following stainless steel fittings that mate and match with Stainless Steel U-Channel:
   1. Fixture hangers
   2. Channel hangers
   3. End caps
   4. Beam clamps
   5. Wiring Stud
   6. Post bases
   7. Rigid conduit clamps
   8. U-bolts

PART 3 EXECUTION

3.1 INSTALLATION

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturers written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of 2 or more parallel runs of conduits to be supported together on channel type hangers where possible. Install supports with spacing indicated and in compliance with NEC requirements.

D. Torque sleeve seal nuts, complying with manufacturer's recommended values. Ensure that sealing grommets expand to form watertight seal.

E. Comply with manufacturer's recommendations for touch up of field cut ends or damaged PVC coated U-channel and fittings.

F. Remove burrs and apply a cold zinc galvanizing paint to field cut galvanized U-channel strut.

END OF SECTION

SECTION 26 05 33

CONDUIT AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections.
2. Section 26 05 19 - Electrical Conductors and Cables.
3. Section 26 05 26 - Grounding for Electrical Systems.
4. Section 26 05 29 - Hangers and Supports for Electrical Systems.
5. Section 26 05 53 - Identification for Electrical Systems.
6. Section 26 27 16 - Electrical Cabinets and Enclosures.
7. Section 26 27 26 - Wiring Devices.
8. Section 33 71 19 - Electrical Underground Ducts and Manholes.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
6. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

C. Underwriter’s Laboratories:
1. UL 6 - Rigid Metal Conduit

1.3 SYSTEM DESCRIPTION

A. Conduit and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Conduit and boxes are shown in approximate locations unless dimensioned. Provide conduit to complete wiring system.

B. Underground: Provide rigid steel conduit or thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.

C. In or Under Slab on Grade: Provide thickwall nonmetallic conduit encased in concrete. Provide rigid steel factory bends greater than 22.5 degrees and for stub-ups through concrete slabs. Provide cast metal or nonmetallic boxes.

D. In Slab Above Grade: Provide galvanized rigid steel conduit. Provide cast metal or nonmetallic boxes.

E. Wet and Damp Locations: Provide PVC-coated, galvanized rigid steel conduit or liquidtight metallic tubing. Provide PVC-coated cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

F. Concealed Dry Locations: Provide electrical metallic tubing for sizes less than 2-inches. Provide galvanized rigid steel or thickwall nonmetallic conduit for sizes 2-inches and larger. Provide cast or sheet-metal boxes.

G. Exposed Dry Locations: Provide galvanized rigid steel conduit. Provide cast metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum Conduit Size: ¾ inch unless otherwise specified.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following:
1. Rigid steel conduit.
2. PVC coated galvanized rigid steel conduit.
3. Electrical Metallic Tubing (EMT).
4. Liquidtight flexible metal conduit.
5. Nonmetallic conduit.
6. Flexible nonmetallic conduit.
7. Nonmetallic tubing.
8. Raceway fittings.
9. Conduit bodies.
10. Surface raceway.
11. Wireway.
12. Pull and junction boxes.
13. Handholes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents:
   1. Record actual routing of all underground electrical conduits and other electrical conduits.
   2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

A. Galvanized Rigid Steel Conduit: ANSI C80.1 and UL 6.

B. Rigid Steel Conduit: ANSI C80.1.

C. Fittings and Conduit Bodies: NEMA FB 1; all steel fittings, unless otherwise specified.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:
   1. Thomas & Betts Corp. Model Adaptasteel Type SPL.
   2. Southwire Model Titan2 Type UL.
   3. Substitutions Permitted: Section 01 60 00 - Product Requirements.

B. Product Description: Interlocked steel construction with PVC jacket.

C. Fittings: NEMA FB 1.

2.3 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.4 NONMETALLIC CONDUIT

A. Manufacturers:
   1. Carlon Electrical Products Model RNC Schedule 80.
   2. Substitutions Permitted: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA TC 2; Schedule 80 PVC.

C. Fittings and Conduit Bodies: NEMA TC 3.

2.5 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.6 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
   1. Material: Galvanized cast iron.
   2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
   3. Cover Legend: "ELECTRIC".

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

B. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

C. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

E. Do not attach raceway to ceiling support wires or other piping systems.

F. Route exposed raceway parallel and perpendicular to walls.

G. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

H. Route conduit in and under slab from point-to-point.

I. Maintain clearance between raceway and piping for maintenance purposes.

J. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

K. Cut conduit square using saw or pipe cutter; de-burr cut ends.

L. Bring conduit to shoulder of fittings; fasten securely.

M. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

N. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

O. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

P. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

Q. Install fittings to accommodate expansion and deflection where raceway crosses expansion joints.

R. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

S. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

T. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

U. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes per Code or as indicated on Drawings, or as specified in section for outlet device.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

D. Fasten flush mounting outlet box between studs.

E. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

F. Install adjustable steel channel fasteners for hung ceiling outlet box.

G. Do not fasten boxes to ceiling support wires or other piping systems.

H. Support boxes independently of conduit.

I. Install gang box where more than one device is mounted together. Do not use sectional box.

J. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with this Contract.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified in this Contract.

C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Labels.
   3. Wire markers.
   4. Conduit markers.
   5. Underground Warning Tape.
   6. Lockout Devices.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Submit manufacturer’s catalog literature for each product required.
   2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

1.3 POST CONSTRUCTION SUBMITTALS

A. Ladder diagram for all electrical control panels built or installed.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved white letters on black contrasting background color.

B. Letter Size:
   1. 1/8 inch high letters for identifying individual equipment and loads.
   2. 1/4 inch high letters for identifying grouped equipment and loads.

C. Minimum nameplate thickness: 1/8 inch.

2.2 LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

A. Description: Cloth or vinyl tape, split sleeve, or tubing type wire markers.

B. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number.
2. Control Circuits: Control wire number as indicated on shop drawings.

C. Ladder Diagram: Full ladder diagram of all wiring in each control panel, plastic laminated and affixed to inside back panel of cover or door.
1. If Ladder Diagram is too large to be laminated and posted, fold and place in plastic dust cover affixed to inside back panel of cover or door.
2. Naming and numbering system on wire labels shall match that shown in Ladder Diagram.

2.4 CONDUIT AND RACEWAY MARKERS

A. Description: Nameplate fastened with straps or adhesive.

B. Color:
1. Medium Voltage System: Black lettering on white background.
2. 480 Volt System: Black lettering on white background.
3. 208 Volt System: Black lettering on white background.

C. Legend:
1. Medium Voltage System: HIGH VOLTAGE.
2. 480 Volt System: 480 VOLTS.
3. 208 Volt System: 208 VOLTS.

2.5 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

2.6 LOCKOUT DEVICES

A. Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 EXISTING WORK

A. Install identification on existing equipment to remain in accordance with this section.

B. Install identification on unmarked existing equipment.

C. Replace lost nameplates, labels, and markers.

3.3 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:
   1. Install nameplate parallel to equipment lines.
   2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
   3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
   4. Secure nameplate to equipment front using rivets or adhesive.
   5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
   6. Install nameplates for the following:
      a. Switchboards.
      b. Panelboards.
      c. Transformers.
      d. Service Disconnects.

C. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install label for identification of individual control device stations.
   3. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:
   1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
   2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
   3. Install labels at data outlets identifying patch panel and port designation.

E. Conduit and Raceway Marker Installation:
   1. Install conduit or raceway marker for each conduit raceway longer than 6 feet.
   2. Conduit and Raceway Marker Spacing: 20 feet on center.

F. Underground Warning Tape Installation:
   1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 26 05 83

TERMINAL BLOCKS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This section covers terminal blocks for control and other wiring.

1.2 SUBMITTALS

A. Products shall be submitted in accordance with the Contract Documents prior to installation.

1.3 MANUFACTURERS

A. Terminal blocks shall be Entrelec, Phoenix Contact, Weidmuller, or equal.

B. Surge protection blocks shall be TELEMATIC, series SD, or equal.

C. Power distribution blocks shall be Ilsco Corporation, or equal.

PART 2 PRODUCTS

2.1 TERMINAL BLOCKS

A. Terminal blocks shall mount on standard DIN rail, and be of the size required for conductors therein. A minimum of 25 percent spares shall be provided in each terminal box. No more than 2 conductors shall be allowed per termination. Jumper bar assemblies shall be installed for interconnecting terminal blocks, distributing power and signal commons. Terminal blocks shall be U.L. rated for 600 Volts, and 30 Amps, minimum.

B. Grounding terminal blocks shall be provided for instrumentation cable shields. The terminal blocks shall have distinctive 2-color bodies, and shall be mounted to the DIN rail with metal screw down type clamps, providing a positive ground connection. One grounding terminal block shall be installed for every 2 instrument cables terminated. Grounding terminal blocks shall be U.L. rated for 600 Volts, and 20 Amps, minimum.

C. Terminal blocks shall be available in a variety of colors, including red, green, blue, gray, black, yellow, and orange.

D. DIN mount fuse holders shall have blown fuse indicators for DC and AC circuits. Fuse holders shall be of the compression clamp type. Fuse holders shall be U.L. listed, and rated for 600 Volts. Fuse sizes shall not exceed the U.L. current rating for the fuse holders.

E. DIN rail shall be prepunched, zinc bichromate plated steel. Symmetrical DIN rail shall be 35mmX7.5mm, minimum.

F. Terminal blocks for 4 to 20 milliamp signals shall have knife disconnect switches, and accessible test points for testing and measurement of current loop signals, without the need for removing wire terminations.

2.2 SURGE PROTECTION BLOCKS (SPB)

A. Analog inputs and outputs shall be terminated at surge protection blocks (SPB).

The SPBs shall be designed for a working voltage of 32 volts, and shall be fused.

B. SPBs shall provide full hybrid line to line protection, and shall have a GDT rating of 10,000 A (8/20µs pulse waveform).

C. SPBs shall be UL94 V-2 listed.

2.3 POWER DISTRIBUTION BLOCKS (PDB)

A. PDBs shall be Electro tin plated and manufactured from high strength 6061-T6 aluminum alloy.

B. PDBs shall be UL Recognized, rated 900 C, and CSA Certified.

C. PDBs shall provide flexibility in using the connector as an in line splice or to reduce conductor size for taps.

D. PDBs shall be rated for 600 Volts and dual rated for Copper and Aluminum Conductors.

E. PDBs shall have the sizes and ratings as shown on the Plans.

PART 3 EXECUTION

3.1 INSTALLATION

A. Each terminal block and fuse holder shall be identified with the circuit number, or conductor number, corresponding to the identification appearing on the shop Drawings for the equipment, or system.

B. Terminal block and fuse holder markers shall be computer printed plastic-type, with permanent markings.

C. End clamps and end sections shall be installed on each terminal block and fuse holder assembly.

D. Terminal blocks for DC voltages shall be blue, and AC voltages shall be gray.

END OF SECTION

SECTION 26 09 16

ELECTRICAL CONTROLS, RELAYS, AND ALARMS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section includes the following:
   1. Pushbutton and Selector Switches
   2. Relays
   3. Alarms
   4. Intrinsic Safety Barriers
   5. Wireways
   6. Watthour Transducers
   7. Elapsed Time Meters and Time Clods

1.2 RELATED WORK

A. Related Sections:
   1. Section 260500– General Electrical Requirements
   2. Section 262716 – Enclosures

1.3 REFERENCES

A. NEMA ICS 1: General Standards for Industrial Control Systems.

B. NEMA ICS 2: Standards for Industrial Control Devices, Controllers and Assemblies.

C. NEMA ICS 6: Enclosures for Industrial Controls and Systems.

D. NEMA ST 1: Standard for Specialty Transformers (Except General purpose Type).

1.4 SUBMITTALS

A. Data: a complete list of equipment and material including manufacturer's descriptive data and technical literature, performance charts, catalog cuts and installation instructions, spare parts data for each different item of equipment specified. The data shall include a complete Bill of Materials.

B. Drawings: containing complete wiring and schematic diagrams, control diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout, anchorage, support and appurtenances of equipment and equipment relationship to other parts of the work including clearances for maintenance and operations.

C. Submit shop drawings in accordance with the Contract Documents, and NEMA ICS 1 specifications indicating control panel layouts, wiring connections and diagrams, dimensions, support points.

1.5 PROJECT RECORD DOCUMENTS

A. Submit record documents in accordance with the Contract Documents.

B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation data in accordance with the Contract Documents.

B. Include instructions for adjusting and resetting time delay relays, timers, and counters.

C. Submit maintenance data in accordance with the Contract Documents.

D. Include recommended preventative maintenance procedures and materials.

PART 2 PRODUCTS

2.1 PUSHBUTTONS AND SELECTOR SWITCHES

A. Pushbuttons, pilot lights and selector switches shall be of the full size, heavy-duty industrial, oil tight, 120 volt, with interchangeable pilot lights, plug-in construction, double break silver contacts, chrome plated lock rings, with modular contacts, and NEMA rating equal to that of the enclosure on which devices are installed. All components shall be flush mounted on front of panel, unless otherwise noted.

B. Provide individual legend plates for indication of switch, pushbutton, and light function (e.g., Open, Closed, Hand-Off-Auto). A list shall be submitted for review and approval

C. Pilot lights shall be high intensity LED type. Pilot lights shall have clear lenses and LED lamps colored as shown on the Plans. Common, remote push-to-test circuitry shall be provided for each control panel to simultaneously test all indicating lights on the panel using a single pushbutton when there are 10 or more lights on the panel. Control panels with less than 10 lights shall utilize individual push-to-test lights and control circuitry.

D. Pushbuttons shall be maintained or momentary as required and as shown on the Drawings. Provide extended head pushbutton for all stop functions, mushroom head for emergency stop functions, and flush head pushbuttons for all other functions. Where indicated on the Drawings pushbuttons shall be illuminated type. Provide locking mechanism for all lock out functions. Selector switches shall have black knob operator, be maintained contact type unless noted otherwise, number and arrangement as required to perform intended functions specified but not less than one double pole, double throw, and double break contact per switch. Contact rating shall be compatible with AC or DC throughput current of devices simultaneously operated by the switch contact but not less than 10 amperes resistive at 120 volts AC or DC continuous.

E. Potentiometers shall be provided with operators and resistive elements of the type and quantity indicated on the Drawings and as required with legend plates indicating percent of span.

F. The above devices shall be manufactured by Allen Bradley, General Electric, or equal.

2.2 RELAYS

A. Timing relays shall be heavy duty, 120V A.C., 10 amps, solid state design, poles as required per application, - 10 degrees C. to +60 degrees C, have timing repeatability of ±2.0% of setting, and be UL listed. The range shall be determined from the control descriptions and or schematic drawings. Provide mounting accessories, as required. The timing relays shall be manufactured by Allen Bradley, Cutler Hammer, or equal.

B. Control relays shall be of the plug-in socket base type with dust-proof plastic enclosures, with silver-cadmium oxide contacts rated 120-V ac, 10 amperes, with contact arrangement and operating coils of the proper voltage as required by the control circuit sequence. Relays shall have indicating lamp to show energized state. Each relay shall have a minimum of two double pole, double throw contacts, or as required. Control relays shall be Allen Bradley, Cutler Hammer, or equal.

C. Alternating relays shall be UL listed, 120 VAC, with contacts rated for 10 amperes at 120 VAC, life expectancy of 100,000 operations, load indicating LEDs, and switch for load locking and load selecting options. Alternating relays shall be manufactured by TimeMark models 261, 271, and 471, and Diversified Electronics model ARA for duplex, triplex, and quadplex alternators.

2.3 ALARMS

A. Audible alarms shall be UL listed, 120 VAC, with solid state circuitry, vibrating horn, non-metallic corrosion resistant housing, with required mounting hardware, suitable for outdoor use capable of producing 100 dB at 10 feet. The audible alarm shall be manufactured by Federal Signal model 350, Edwards model 870--EX, or equal.

B. Beacons for interior and/or exterior locations shall be rated NEMA 4X, flashing type (90 times per minute, minimum) with a red lens. Beacons shall be as manufactured by Federal Signal, Model 225XL, or equal.

2.4 INTRINSIC SAFETY BARRIERS

A. Intrinsic safety barriers shall permit connection of devices located in a hazardous area to other devices located in a safe area. Intrinsic safety barriers shall be EMC compliant, 10 to 35 V dc, 35 mA output current, hazardous area terminals identified by blue labels, terminals accommodating conductors up to 12 AWG, ambient temperature rating of -20 to +60°C. The intrinsic safety barriers shall be manufactured by Allen-Bradley Bulletin 937, or equal.

2.5 WIREWAYS

A. Wireways shall be PVC, snap-in slot design, with non-slip cover. Safe area wireways shall be light gray and marked "Safe Area Wiring." Hazardous area wireways shall be intrinsic blue and marked "Hazardous Area Wiring." The wireways shall be manufactured by Panduit Corporation, or equal.

2.6 WATTHOUR TRANSDUCERS

A. Watthour transducers for active or reactive power shall be DIN rail and surface mount, single phase or three phase with balanced or unbalanced load, electrically isolated input and

output signals, 4 to 20 mA output signal, 0-10 mA to 0-10 A input current, 0-10 V to 0-600 VAC input voltage, 16-500 Hz selectable frequency. The watthour transducers shall be manufactured by Sineax model PQ502, or equal.

2.7 ELAPSED TIME METERS AND TIME CLOCKS

A. Elapsed time meters shall be self-powered, non-reset, solid state counter which provides silent, accurate and noise immune operation. Elapsed time meters shall require no external power, five year minimum battery life, 120 VAC power, accessories for panel mounting, nameplate below LCD display reading "HOURS", liquid crystal display with 6 digits approximately 2 inches high with 50,000 hour minimum display life and indication of sufficient battery power. The elapsed time meters shall be manufactured by Durant, Automatic Timing and Controls a Division of Sycon Corp., or equal.

B. Time clocks shall be microprocessor based, have 24 hour time control, up to 24 operations per day, programmable from panel face keys, skip-a-day feature allowing schedule to be skipped for one to seven days, SPDT switch contact rated at 15 amps at 120 V AC, with battery carryover to maintain time and program during power outage for 275 hours. The time clocks shall be manufactured by Tork, Paragon Electric Company, or equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Fasteners shall be type 304 stainless steel.

B. Install devices in strict accordance with NEC requirements and per manufacturer’s recommendation.

C. Coordinate with other trades as necessary during installation of these devices.

3.2 ACCEPTANCE

A. All installations are subject to evaluation in accordance with NEC requirements and manufacturers recommendations. Contractor shall remove the unacceptable work and correct work at no charge to IHS.

END OF SECTION

SECTION 26 28 22

LOW VOLTAGE CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish and install, low voltage circuit breakers, as indicated on the Drawings and specified herein.

1.02 SUBMITTALS

A. Products shall be submitted in accordance with the Contract Documents prior to installation.

1.03 QUALITY ASSURANCE

A. The breaker manufacturer's facilities shall be ISO 9001 certified.

PART 2 PRODUCTS

2.01 GENERAL

A. Circuit breakers shall be manufactured by Cutler-Hammer, Allen-Bradley, General Electric, or equal.

B. Circuit breaker frame, trip, short circuit, and interruption ratings shall be as indicated on the Drawings, except that they shall be coordinated with the ratings of the equipment actually furnished, and shall be modified where necessary to suit the equipment. Circuit breakers to be used in motor control centers shall be as indicated on the Drawings. Where no indication of type is given on the Drawings circuit breakers protecting motors shall be motor circuit protectors, and other circuit breakers shall be molded case type.

C. Circuit breaker for mounting in motor control centers, or for separate mounting shall be of the air-break type, quick-make and quick-break, 600 volts, with number of poles as indicated on the Drawings.

D. Each pole of the circuit breaker shall provide inverse time delay, and instantaneous circuit protection.

E. The breakers shall be operated by a handle, and shall have a switching mechanism that is mechanically trip free from the handle, so that the contacts cannot be held closed against short circuits, and abnormal currents. Tripping due to overload, or short circuit shall be clearly indicated by the handle automatically assuming a position between the manual ON and OFF positions. Latch surfaces shall be ground and polished. Poles shall be constructed so that they open, close, and trip simultaneously.

F. Breakers must be completely enclosed in a molded case. Non-interchangeable trip breakers

shall have their covers sealed; interchangeable trip breakers shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. The minimum interrupting ratings of the circuit breakers shall be at least equal to the available short circuit current at the line terminals.

G. Circuit breakers shall conform to the applicable requirements of UL 489.

H. Molded case circuit breakers shall be ambient temperature compensating that provides inverse time delay overload and instantaneous short circuit protection by means of a thermal-magnetic element. Compensation shall be accomplished by a secondary bi-metal that will allow the breaker to carry rated current between 25 degrees C and 50 degrees C with tripping characteristics that are approximately the same throughout this temperature range.

I. On breakers with interchangeable, thermal, adjustable magnetic trip, the accessibility and position of the adjustment knob shall not be changed from those on the standard breaker.

J. Unless mounted in a switchboard, or panelboard, circuit breakers shall be housed in a NEMA rated enclosure as described elsewhere in these specifications.

K. Provide circuit breakers with shunt trip mechanisms where shown on the Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Circuit breakers shall be installed as indicated on the Drawings and per manufacturer's instructions.

END OF SECTION

SECTION 26 32 43

BATTERY ENERGY STORAGE SYSTEM (BESS)

PART 1 GENERAL

1.1 SUMMARY

A. Section includes battery energy storage system (BESS) consisting of inverter, battery modules, protected loads panel or automatic transfer switch, associated wiring, and commissioning.

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections.
2. Section 26 05 19 - Electrical Conductors and Cables.
3. Section 26 05 26 - Grounding for Electrical Systems.
4. Section 26 27 16 - Electrical Cabinets and Enclosures.
5. Section 26 36 43 - Automatic Transfer Switches

1.2 REFERENCES

A. National Electrical Code (NEC), NFPA 70.

B. NFPA 855 - Installation of Stationary Energy Storage Systems.

C. UL 9540 - Energy Storage Systems.

D. UL 1741 - Inverters, Converters, Controllers.

E. IEEE 1547 - Interconnection of Distributed Energy Resources.

F. IEEE 519 - Harmonic Control in Electrical Power Systems.

1.3 SYSTEM DESCRIPTION

A. Provide complete battery energy storage system as indicated on Drawings.

B. System shall provide 120/240V split-phase output, 7,600W continuous islanded output, 32A RMS continuous output current, and permit 30 percent split-phase imbalance.

C. System shall support minimum connected load of 2.52 kW with 25 percent design margin..

1.4 DESIGN REQUIREMENTS

A. Minimum Inverter Continuous Rating: 7.6kW.

B. Continuous Output Current: 32A.

C. Peak Motor Starting Capability: 50A RMS for 2 seconds.

D. Maximum allowable split-phase imbalance: 30 percent.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Inverter, battery modules, UL listings, and installation instructions.

C. Shop Drawings: One-line diagram, load distribution schedule, mounting details.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Maintenance procedures and warranty information

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 INVERTER

A. Manufacturers:
   1. Generac PWRcell Inverter.
   2. Or Engineer Approved Equal.

2.2 BATTERY MODULES

A. Manufacturers:
   1. PWRcell 2 DCB Battery Module
   2. Or Engineer Approved Equal.

2.3 BATTERY CABINET

A. Manufacturers:
   1. PWRcell 2 Cabinet APKE00076
   2. Or Engineer Approved Equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install system in accordance with manufacturer’s written instructions and NEC.

B. Balance loads between L1 and L2 to maintain inverter split-phase imbalance within 30 percent.

C. Perform voltage verification, transfer test to island mode, and load test at minimum 3 kW.

END OF SECTION

SECTION 26 36 23

AUTOMATIC TRANSFER SWITCH (ATS)

PART 1 GENERAL

1.1 SUMMARY

A. Section includes automatic transfer switches (ATS) for use with the project Battery Energy Storage Systems (BESS), including open-transition automatic transfer switches, service entrance rated and non-service entrance rated configurations, NEMA 3R enclosures, and load management capability.

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections.
2. Section 26 05 19 - Electrical Conductors and Cables.
3. Section 26 05 26 - Grounding for Electrical Systems.
4. Section 26 27 16 - Electrical Cabinets and Enclosures.
5. Section 26 32 43 – Battery Energy Storage System

1.2 REFERENCES

A. National Electrical Code (NEC), NFPA 70.

B. Underwriters Laboratories: UL 1008 - Transfer Switch Equipment.

C. NEMA 250 - Enclosures for Electrical Equipment.

1.3 SYSTEM DESCRIPTION

A. Provide automatic transfer switch specifically designed for integration with project Battery Energy Storage System (BESS).

B. Switch shall be open-transition type, rated 120/240V single-phase and compatible with BESS.

C. Installation without a BESS is not permitted.

1.4 DESIGN REQUIREMENTS

A. Voltage: 120/240V, 1 Phase.

B. Load Transition Type: Open Transition.

C. Enclosure: NEMA 3R.

D. Compliance: UL 1008 Listed.

E. Lug Range: 1/0 – #14 AWG.

F. Enclosure: Aluminum, NEMA 3R rated, suitable for indoor or outdoor installation.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data

C. Shop Drawings: One-line diagram, mounting details.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Maintenance procedures and warranty information

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 ATS

A. Manufacturers:
   1. Generac CXSC100A301
   2. Or Engineer Approved Equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install system in accordance with manufacturer’s written instructions and NEC.

B. Perform voltage verification, utility-to-BESS transfer test, and return-to-utility test.

END OF SECTION

SECTION 44 10 15

WATER QUALITIY MONITORING AND

CONTROL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. The Ke-nek water system planned improvements will draw raw water from a surface intake on Owl Creek and an infiltration gallery on Tully Creek. The water will gravity feed through the Owl Creek intake and be pumped from the Tully Creek intake to the treatment train. The water shall be pre-treated through a roughing filter; treated through a slow sand filter bed, then chlorinated, before flowing into storage.

This project shall incorporate water treatment monitoring equipment to meet EPA reporting requirements. This work includes a free chlorine analyzer; a differential pH with temperature sensor; a tank level pressure transducer/transmitter, turbidimeters, and a flow meter transmitter. Power and telephone communications connection points shall be provided by local utility companies.

The water treatment monitoring equipment shall communicate with the Cloud-based SCADA system currently utilized by the Yurok Public Water System. The sensor and monitoring equipment listed in this document shall communicate through the Module Channel Controller, both to pass on information to the SCADA system and to actuate alarms and dosing equipment. All HACH products are to be integrated with the existing CLAROS data system utilized by the Yurok Tribe. MODBUS or 4-20mA-based communication protocols shall be used, or other with engineer approval.

B. System to be installed from single supplier.

1.2 REFERENCES

A. National Electric Code
B. NFPA 79 Electrical Standard for Industrial Machinery
C. Underwriters Laboratories, Inc. (UL)

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.

C. Product Data: Submit catalog data for each component specified showing electrical characteristics and connection requirements.

D. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

E. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets.

C. Operation and Maintenance Data: Submit bound copies of operating and programming instructions, and include card replacement, adjustments, and preventive maintenance procedures and materials.

1.5 TRAINING

A. Training program shall educate operators and maintenance personnel with the required level of system familiarity to provide a common working knowledge concerning all significant aspects of the system being supplied.

B. System supplier shall provide one half day (4 hours) of training.

C. System supplier shall provide all instructional course material, equipment and manuals to conduct the training program. Tribe shall provide facilities for training.

1.6 GENERAL REQUIREMENTS

A. All components shall be new, unused and UL listed.

B. All wiring shall be numbered using an owner approved numbering system.

1.7 ACCEPTANCE

A. Work covered by this section shall not be accepted until testing connected with this work has been completed satisfactorily.

B. Work found defective in performance shall be corrected.

PART 2-PRODUCTS

2.1 FREE CHLORINE AND pHD DIFFERENTIAL SENSOR

A. Manufacturer and Product List

1. Hach CLF10SC and pHD Differential Sensor

B. Product Info

1. Continuous Sampling
2. Reagentless, electrochemical, three-electrode amperometric system
3. Combining the pH and chlorine reading into one channel for the Module Channel Controller

2.2 TURBIDIMETER

A. Manufacturer and Product List
1. Hach TU5300sc

B. Product Specifications
1. Samples at a programmable rate, with capability for every 15 minutes.
2. Measurement Range: 0-700 NTU
3. With Vial Replacement Tool, Drying Cartridge, Flow Regulator, Mounting Set
4. 100 – 1000 mL/min sampling rate

2.3 MODULE CHANNEL CONTROLLER

A. Manufacturer and Product List:
1. Hach SC4500

B. Product Information:
1. Menu-driven display, with touchpad
2. With alarm capabilities
3. Power: US Power Cord
4. Communication: Modbus, Ethernet, Analog 4-20 mA analog input
5. Connectivity: LAN Ethernet, Cellular 4G, Wi-Fi
6. Data storage card functionality, for software upload and data logging
7. Remote reading functionality and remote data download
8. Programmable alarm points, formulaic interpretations of signals

PART 3-EXECUTION

3.1 GENERAL SITE INFORMATION

A. Kenek Water Treatment Plant – Perform all work in accordance with the drawings and technical specifications to connect the monitoring equipment controller to the Module Channel Controller, and accordingly, the Yurok Public Water System's cloud-based SCADA system

3.2 EXECUTION

A. Free Chlorine Analyzer
1. Must operate unattended for 30 days between chemical reagent changes and measurement cell cleaning.
2. Available control options are:

a. On/off control where the concentration alarm outputs activate or deactivate a pump when chlorine levels fall below or exceed acceptable levels.
b. Proportional control where the 4-20mA output current is scaled to pace a feed pump proportional to output.

3. Standard SPDT relay alarms, 5 amp resistive loads at 230V AC power, Alarm options: concentration set point, analyzer system warning, and analyzer system shut down.
4. Provide 1 Hach Maintenance Kits for CLF17 Chlorine Analyzer and 11 Hach Free Chlorine Reagent Sets to Owner.

B. Differential pH Sensor
1. Mount the sensor the electrode facing down with 1-inch NPT threads for end of pipe for immersion into vessel.
2. Output: Must be compatible with the SC1000 and existing cloud-based SCADA. If needed, an interface shall be provided to make it compatible.
3. Provide: 2 Salt Bridge Replacements

C. Tank Level Transmitter
1. Mounted to tank outlet to measure water level within the tank, in-line readings
2. To trigger alarm at customizable low-level set point
3. Output: 4-20 mA signal, or as readable by selected module channel controller
a. Scaling from empty tank level (4mA) to full tank level (20mA)

D. Turbidimeter
1. Measures combined effluent turbidity of slow sand filter
2. In-line live measurement reading
a. Schedulable intervals to log data every 4 hours, or other interval per YPUD
3. Output: 4-20 mA signal, or as readable by selected module channel controller
4. Alarm for exceeding 1 NTU, or as specified by YPUD.

E. Control System
1. Install in accordance with manufacturer's specifications and supplier recommendations.
2. Install in accordance with NEC and state and local codes.
3. Supply surge protection for all control components.
4. Complete testing and training as specified.
5. Provide the PLC and MODBUS programming to establish the control and monitoring parameters.
6. Provide coordination with the MODBUS programmer to provide data address configuration, polling sequence and timing.
7. Monitored values:
a. Free Chlorine Residual
b. pH
c. Temperature
d. Water Level in Tank
e. Flow
f. Turbidity (x3)
- Pre-Roughing Filter
- Post-Roughing Filter, Pre-Slow Sand Filter
- Post-Slow Sand Filter

8. Configure DMR system for the Owner using the software included with the product to:
   a. Scale each 4-20 mA input received from the various monitoring instruments (chlorine analyzer, pH sensor, temperature sensor, turbidimeter and tank level transmitter) for viewing/retrieval in standard engineering units.
   b. Record, time stamp, and save in memory each monitored value at a specified interval
      - normally every 15 minutes or as directed by the Engineer.

F. Conduit and Wireways:
   1. Wireways and exposed conduit shall be run parallel to floors and walls.
   2. Conduit bends shall be constant radius without wrinkles, made with an appropriate sized bending tool.
   3. The total of the bends in a conduit run between junction boxes or pulling elbows shall be less than 360 degrees.

G. Conduit Support:
   1. Metallic conduit supports at least every 10 feet and within 3 feet of an outlet box, junction box, cabinet or fitting.
   2. Non-metallic conduit supports at least every 3 feet for 1 inch and smaller and every 5 feet for conduit larger than 1 inch.
   3. Support shall be one or two hole straps manufactured for the type and size conduit to be supported.

H. Conduit Cutting:
   1. Conduit shall be saw cut.
   2. Conduit: All sharp edges and burrs to be removed by reaming or filing.
   3. Water pipe or nipples shall not be used unless the cut ends are reamed or filed to remove all burrs or sharp edges.

I. Conductor Protection: Protect conductors at conduit ends, nipples or connections by plastic insulating bushings or insulated throats unless the fitting provides equivalent protection.

J. Testing and Startup
   1. All elements of system shall be tested to demonstrate adherence to these Specification.
      a. System supplier shall provide all special testing, calibration, materials and equipment.
      b. System supplier shall coordinate and schedule all testing and startup work with the YPUD and Project Engineer.
      c. Testing shall include requirements as follows:
         1) PLC and controls,
         2) chlorine analyzer,
         3) differential pH,
         4) temperature sensor,
         5) turbidity sensor,
         6) flow meter and transmitter,
         7) and tank level transmitter.
   2. Make final settings as directed by YPUD or Project Engineer

K. INPUT/OUTPUT Schedule

1. INPUT: Tank Level Submersible Pressure Transducer
   a. 4-20 mA signal
2. INPUT: Live Reading Turbidimeter
   a. 4-20 mA signal
3. INPUT: Free Chlorine Analyzer
   a. 4-20 mA signal
4. INPUT: pH and Temperature
   a. 4-20 mA signal
      1) The Hach pHD-SC sensor outputs the differential pH as a voltage signal, -1500 mV to 1500 mV. The Digital Gateway specified translates this signal to a 4-20mA signal as usable by the specified Module Channel Controller
      2) The Hach pHD-SC sensor also contains a thermistor for temperature reading and for automatic adjustment of pH reading
5. OUTPUT: Chlorine Chemical Pump Controls
6. OUTPUT: Low Water Alarm
7. OUTPUT: Low Chlorine Alarm
8. OUTPUT: High Turbidity Alarm

END OF SECTION