Spokane Tribe of Indians
P.O. Box 100 • Wellpinit, WA 99040 • (509) 458-6500 • Fax (509) 458-6575

REQUEST FOR PROPOSALS

Spokane Tribal Hatchery
Fish Production Well
Variable Frequency Drive
Replacement

NO. FY26-TBD

BY
SPOKANE TRIBE OF INDIANS
PURCHASING/PROPERTY
DEPARTMENT
6195 FORD/WELLPINIT RD
PO BOX 100
WELLPINIT WA 99040

KEY INFORMATION

Contact	Raynee St.Pierre
Phone	509-458-6550
Opening Date	**10/22/2025**
Closing Date	**11/5/2025 @ 4pm**
Return Location	Purchasing/Property Manager
Delivery Address	6195 Ford/Wellpinit Rd
	Wellpinit WA 99040
	PO Box 100
E-mail	Raynee.stpierre@spokanetribe.com

I. INTRODUCTION

The Spokane Tribe of Indians (STOI) is requesting total cost proposals from qualified contractors to **replace a fish production well variable frequency drive (VFD) at the Spokane Tribal Fish Hatchery**.

There are no expressed or implied obligations for the SPOKANE TRIBE OF INDIANS to reimburse responding firms for any expenses incurred in preparing proposals in response to this request. Your proposal and proposal amount shall remain valid for a period of ninety (90) days from the closing date.

To be considered responsive, responsible, reliable, qualified, and possessing the ability to complete the entire project, your complete proposal must be received by Raynee St. Pierre, Purchasing/Property Manager, Spokane Tribe of Indians, P.O. Box 100, Wellpinit, WA 99040 or via email (raynee.stpierre@spokanetribe.com) on or before the above closing date and time.

During the evaluation process the STOI serves the right, where it may serve the STOI best interest, to request additional information or clarifications from proposers or allow corrections of errors or omissions.

The STOI reserves the right to retain all proposals submitted and to use any ideas in the proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this request for proposals.

Vendors are strongly encouraged to carefully read the entire request for proposal. The Spokane Tribe of Indians is a federally recognized Indian Tribe and is eligible for GSA and/or government pricing. There are no expressed or implied obligations for the STOI to reimburse responding firms for any expenses incurred in preparing proposals in response to this request.

Term of Engagement

Awarded vendor will be obligated and authorized to sign and/or enter into a contract with the STOI to complete the scope of work listed in this request for proposal.

Contact Persons

All questions regarding this request for proposal will be taken and/or answered up to the closing date and time of this proposal. Questions regarding RFP submission requirements should be directed to the STOI Purchasing/Property Manager while project technical and site related questions should be directed to STOI Spokane Tribal Fish Hatcher Manager.

Purchasing/Property Manager
Raynee St. Pierre – (509) 458-6550
(raynee.stpierre@spokanetribe.com)
Spokane Tribe of Indians
P.O. Box 100
Wellpinit, WA. 99040

Spokane Tribal Fish Hatchery Manager
Tim Peone – (509) 258-7297
(timpeone@spokanetribe.com)
Spokane Tribe of Indians
PO Box 100
Wellpinit, WA. 99040

II. SCOPE OF REQUESTED SERVICES

STOI Spokane Tribal Fish Hatchery is in need of replacing an existing variable frequency drive controlling a 50 hp fish production well pump with a new one. Work will include removable of the existing drive and replacing with new one per **ALL** technical specifications and aspects as listed in Attachment B – Hatchery Upgrades Design Project – Well #4 VFD Replacement Volume 1.

III. WARRANTIES

1. Minimum 1-year workmanship warranty.
2. Contractor responsible for meeting Manufacturer's Specific Warranty Requirements.

IV. SUBMISSION AND PROPOSAL CONTENT REQUIREMENT

Proposals must include:

1. Pre-proposal site visit with Spokane Tribal Hatchery Manager required to view existing infrastructure (hardware and software components) and collect any additional information to develop a total cost proposal that meets all technical specifications and aspect requirements as listed in Attachment B – Hatchery Upgrades Design Project – Well #4 VFD Replacement Volume 1.
2. Total Cost with breakdowns of all services and products to complete full scope of work that meets all technical specifications and aspect requirements as listed in Attachment B – Hatchery Upgrades Design Project – Well #4 VFD Replacement Volume 1.
3. Proposed project timeline. Note: Project completion desired by July 31, 2026.
4. Proof of insurance and bonding (if applicable).
5. A copy of the RFP with Certifications **via vendor signature** regarding:

    - Debarment/Suspension – See Attachment A.
    - Total cost proposal includes signature certification that cost is accurate and valid withholding for vendor selection and contact award.

V. GENERAL INFORMATION

RFP Submission, Review and Evaluation of Vendor

All proposals must be hand-delivered, mailed, or emailed and received by the Purchasing/Property Department with ONE MASTER by the closing date and time. Any proposal received after the closing date and time or submitted to another department will be considered non-responsive. The award will be proposed as a vendor who is considered responsive, responsible, reliable, qualified, and possesses the ability to provide all the desired services, and whose proposal conforms to all requirements. No liability will be attached to STOI for the premature opening of, or the failure to open, any proposals not properly addressed and identified.

STOI "may" or "may not", elect to award this project for the listed items from the best-qualified vendor for all specifications listed above and according to the request for proposal. STOI may waive any informalities or minor defects or reject any and all

proposals. Vendors must satisfy themselves of the accuracy of the estimated quantities or needs of the STOI. After proposals have been submitted, the vendor shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be done.

STOI assumes no responsibility for any understanding or representations concerning conditions made by any of its officers, agents, or employees prior to the execution of a signed contract, unless such understanding or representations are expressly stated in the Proposal.
Any proposal may be withdrawn prior to the above closing date and time. Any proposal received after the time and date specified shall not be considered.

This RFP does not commit the Spokane Tribe of Indians to award a contract. The Spokane Tribe of Indians reserves the right to:

a. Request clarification and additional information from any potential contractors during the evaluation process.
b. Issue subsequent RFPs based on refinement of concepts proposed in response to this request.
c. Conduct investigations of the qualifications of the Applicant/Vendor as deemed appropriate.

Preference in the award shall be given to Indian and Alaskan Native organizations in the amount of five percent (5%) of the total proposal price. Any contractor claiming Indian Preference must meet and show evidence of the preference according 2 CFR, chapter I, part 200, sec. 200.54

Supplier Diversity – Is your company at least 51% owned by a Native American, Minority or Woman (NA, M/WBE)? (Minority group members are United States citizens who are African- American, Asian-Indian American, Asian-Pacific American or Hispanic-American). Ownership means the business is at least 51% owned by such individuals and, management and daily operations are controlled by them as well. Responding vendors must check and provide requested information listed below:

Can your firm be classified as a Native American Enterprise? YES___NO ___If yes % _____.

Can your firm be classified as a Minority Owned Business? YES___NO ___If yes % _____.

Can your firm be classified as a Woman Owned Business? YES___NO ___If yes % Incurred

Expenses
STOI shall not be responsible for any expenses incurred by vendor in responding to this RFP. All costs incurred by vendor in the preparation, transmittal or presentation of any proposal or material submitted in response to this RFP will be borne solely by the vendor. All submitted proposals and/or information in their entirety will become property of the STOI.
Partners, Supervisory, and Staff Qualifications and Experience

The vendor should identify the principal supervisory and management staff, including engagement partners, managers, other supervisors and specialists, who would be assigned to the engagement and indicate whether each such person is licensed to practice or provide this type of technical service in the state of Washington. Assurances must be made to STOI that the staff listed will be the actual staff performing the services to be provided.

Insurance Requirements
The awarded vendor will be required to provide certificates of insurance for:

A. Comprehensive or Commercial Form General Liability Insurance (contractual liability included) with limits as follows:

Each Occurrence	$1,000,000.00
Personal and Advertising Injury	$1,000,000.00

If the above insurance is written on a claims-made form, it shall continue for three years following termination of this Agreement. The insurance shall have a retroactive date of placement prior to or coinciding with the effective date of this Agreement.
B. Business Automobile Liability Insurance for owned, scheduled, non-owned, or hired automobiles with a combined single limit not less than $1,000,000.00 dollars per occurrence.

C. Workers' Compensation as required by Washington State law.

It is understood that the coverage and limits referred to under a., b., and c. above shall not in any way limit the liability of Seller. Seller shall furnish the Tribe with certificates of insurance evidencing compliance with all requirements prior to commencing work under a contract resulting from this RFP.

Evaluation of Proposals
Proposals submitted will be evaluated by selected individuals from STOI, administration Department, Department of Natural Resources Department (Spokane Tribal Hatchery Program Manager), and the Purchasing/Property Department. STOI Tribal Council will make the final decision and/or approval. STOI will award the contract to the vendor whose proposal is deemed to be most advantageous to STOI.

Proposals will be evaluated using four sets of criteria; however, criteria will not be awarded on points but on completeness and confirmation of each, in order. STOI is aware that projects vary in size, time, and services needed so the awarded vendor will be awarded according to the following.

1. Responsiveness, Reliability, Responsibly and Technical Qualifications
   Submitter's responsiveness, reliability, responsibility, technical qualifications, skill,
   knowledge and experience in similar projects will be considered under this evaluation factor. Also, they focus on those people assigned to the STOI contract, **and** on the characteristics of the submitter firm as a whole, if applicable.

2. Fees and Delivery Timeline
   Cost provided by the submitter will be considered under this criterion. In addition, the promptness of delivery of services proposed will be factored into consideration in the cost of services.

3. Indian Preference
   Indian-owned and controlled companies will receive preference in accordance with 25 U.S.C. §450e(b)(7). Companies claiming Indian preference must furnish adequate proof of at least 51% Indian ownership and control with their proposal in order to secure Indian- owned points. A successful vendor will be required to comply with all applicable Federal and Tribal laws and regulations in effect during the contract period, including the Indian preference requirements of the Tribe.

4. Submitter's References
   Submitter must provide three (3) references providing names, addresses and telephone numbers for STOI to contact.

Irregularities in Proposals
STOI may, at their discretion, waive technical irregularities in the proposal format of any vendor selected for award, which do not alter the price, quality or quantity of the services offered. Protest to be filed under STOI's Administrative Procedures Ordinance.

Award Notice
STOI shall provide notice of the award to all vendors upon final approval and review all submitted proposals. The award shall be contingent upon successful negotiations of a final contract between STOI and the vendor whose proposal is accepted by STOI.

Proposal Confidentiality
Until the award is made and notice is given to all vendors, no employee, agent, or representative of a submitting vendor shall make available or discuss its proposal with any officer, member, employee, agent or representative of STOI other than the contact person, except in response to inquiries from the contact person as part of the evaluation process. Until the award is made and notice of award is given to all vendors, STOI will not disclose the contents of any proposal or discuss the contents of any proposal with any vendor.

Proprietary Information
Any restrictions on the use of data contained in a proposal must be clearly stated in the proposal itself. Proprietary information submitted in response to the Request for Proposal will be handled in accordance with applicable STOI procurement regulations. Data contained in the proposal, all documentation provided therein, and innovations developed because of these contractual services cannot be copyrighted or patented by vendors. All data, documentation, and innovations become the property of STOI who may waive any informalities or minor defects or reject all proposals.

VI. SUBCONTRACTING

No Subcontracting will be permitted under this award.

VII. COVENANTS AGAINST KICKBACKS

All conditions regarding covenants against kickbacks under 48 CFR Ch. 1-52.203-7 apply. Failure to abide by the provisions of this section may, without further notice, result in the immediate termination of any contract awarded.

VIII. RESERVATIONS

THE SPOKANE TRIBE OF INDIANS RESERVES:

1. The right to reject any RFP, or all proposals/bids, to serve in the best interest of the Spokane Tribe.
2. STOI may cancel this RFP at any time for any reason. STOI may reject any and/or all proposals/bids for any reason as determined by STOI.
3. The right to negotiate with all or one respondent when such action is deemed to be in the best interest of the Spokane Tribe.
4. The right to cancel any agreement, if in its opinion there is a failure at any time to perform adequately the stipulations of the request for proposal, or if there is any attempt to willfully impose upon the Spokane Tribe services which are in the opinion of the Spokane Tribe of an unacceptable quality.
5. The right to require the awarded vendor to obtain and/or have in place General Liability Insurance in an amount no-less than the limits of the Spokane Tribe of Indians General Liability Coverage.

Attachment A

Contractor Certification Regarding Debarment, Suspension, and Other Responsibility Matters

The prospective contractor certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal, State, Local or Tribal department or agency;

(b) Have not within a five-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, Local or Tribal) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, Local or Tribal) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, Local or Tribal) terminated for cause or default.

Typed name & Title of Authorized Representative

Signature of Authorized Representative

_____ Date: _____

☐ I am unable to certify the above statements. My explanation is attached.

Attachment B

Spokane Tribal Hatchery

Hatchery Upgrades Design Project
Well # 4 VFD Replacement
Volume 1

Issued for Bid
Technical Specifications
Division 01 - 46

ATTACHMENT B

Spokane Tribe of Indians

Spokane Tribal Hatchery

Hatchery Upgrades Design Project – Well #4 VFD Replacement

Volume 1 of 2
Issued for Bid
Technical Specifications
Divisions 01 - 46

Prepared For: The Spokane Tribe of Indians

Prepared By: McMillen, Inc.

September 10, 2025

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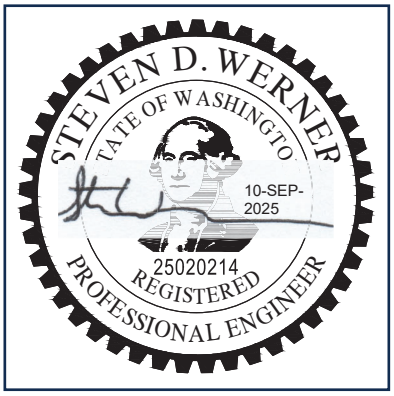

Electrical Engineer
Steve Werner, PE

Project Manager
Noah Hornsby, PE

This document was prepared under the supervision of registered Professional Engineers.

SPOKANE TRIBE OF INDIANS
HATCHERY UPGRADES DESIGN – WELL #4 VFD REPLACEMENT
TECHNICAL SPECIFICATIONS

100% DRAFT
TABLE OF CONTENTS

Division 01 – General Requirements

Division 26 – Electrical

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 – GENERAL

1.1 SUMMARY

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract comprises the removal of the existing Well #4 Variable Frequency Drive and Cabinet, and replacement with a new Variable Frequency Drive and Cabinet.

B. The Work is located at the Spokane Tribal Hatchery, 5629 Hatchery Road, Wellpinit, Washinton.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 - Contractor Submittals.

B. Detailed outage plan, schedule, and requests, if needed.

1.4 WORK BY OTHERS

A. Where two (2) or more contracts are being performed at one (1) time on the same Site or adjacent land in such manner that work under one contract may interfere with work under another, the Owner will determine the sequence and order of the Work in either or both contracts. When the Site of one contract is the necessary or convenient means of access for performance of work under another, the Owner may grant privilege of access or other reasonable privilege to the Contractor so desiring, to the extent, amount, and in manner and at time that the Owner may determine. No Owner determination of method or time or sequence or order of the work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the work. The Contractor shall conduct their operations so as to cause a minimum of interference with the work of such other contractors and shall cooperate fully with such contractors to

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

B. Interference With Work On Utilities: The Contractor shall cooperate fully with all utility forces of the Owner or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the Work, and shall schedule the Work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.5 CONTRACTOR USE OF SITE

A. The Contractor's use of the Site shall be limited to their construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

1.6 OUTAGE PLAN AND REQUESTS

A. Unless the Contract Documents indicate otherwise, the Contractor shall not remove from service, de-energize, or modify settings for any existing operating tank pipeline, valve, channel, equipment, structure, road, or any other facility without permission from the Engineer.

B. Where the Work requires modifications to existing facilities or construction of new facilities and connection of new facilities to existing facilities, the Contractor shall submit a detailed outage plan and schedule for the Engineer's approval a minimum of two (2) weeks in advance of the time that such outage is planned.

C. The Engineer shall be notified in writing at least one week in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.

D. The Contractor shall provide written confirmation of the shutdown date and time two (2) working days prior to the actual shutdown.

1.7 [OWNER USE OF THE SITE]

A. The Owner may utilize all or part of the existing Site during the entire period of construction of the construction for the conduct of the Owner's normal operations. The Contractor shall cooperate and coordinate with the Owner to facilitate the Owner's operations and to minimize interference with the Contractor's operations at the same time. In any event, the Owner shall be allowed access to the Site during the period of construction.

1.8 PROJECT MEETINGS

A. Preconstruction Conference

1. Prior to the commencement of Work at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended

by the Contractor's Project Manager, their superintendent, and/or their subcontractors as the Contractor deems appropriate. Other attendees will be:

a. Engineer, Construction Manager, and/or the Resident Project Representative.

b. Representatives of Owner.

c. Tribal representatives as appropriate.

d. Others as requested by Contractor, Owner, or Engineer.

2. The Contractor shall bring the preconstruction conference submittals in accordance with Section 01 33 00 - Contractor Submittals.

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date.

4. The Construction Manager will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

B. Progress Meetings

1. The Engineer will schedule and hold regular on-Site progress meetings at least weekly and at other times as requested by Contractor or as required by progress of the Work. The Contractor, Engineer, and all subcontractors active on the Site shall attend each meeting. The Contractor may, at their discretion, request attendance by representatives of their suppliers, manufacturers, and other subcontractors.

2. The Engineer will preside over the progress meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings is to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the Contractor shall present any issues that may impact their progress with a view to resolve these issues expeditiously.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

– END OF SECTION –

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SECTION 01 33 00 – CONTRACTOR SUBMITTALS

PART 1 – GENERAL

1.1 SUMMARY

A. Wherever submittals are required in the Contract Documents, submit them to the Owner or Owner's Resident Representative as directed.

B. Within seven (7) Days after the date of commencement as stated in the Notice to Proceed, the Contractor shall submit the following items for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid. The schedule of submittals shall be based on Contractor's priority, planned construction sequence and schedule, long lead items, and size of submittal package. Allow time for resubmittals.

2. A list of permits and licenses the Contractor shall obtain, indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.2 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference the following items shall be submitted to the Owner for review:

1. A revised schedule of Shop Drawings, Samples, and proposed Substitute ("Or-Equal") submittals listed in the Bid.

2. A list of permits and licenses the Contractor shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

1.3 SHOP DRAWINGS

A. All shop drawing submittals along with the shop drawing transmittal form, shall be made electronically in ".pdf" format and distributed by email from the Contractor to the Owner's Resident Project Representative (RPR). The Owner'S RPR shall be responsible to distribute each shop drawing to all reviewers and to receive and compile all review comments generated.

B. Wherever called for in the Contract Documents or where required by the Engineer, the Contractor shall furnish a clear (non-scanned) electronic version, of each Shop Drawing submittal. Shop Drawings may include detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall

bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is located, unless otherwise indicated.

C. Shop Drawing submittals shall be accompanied by the Owner's standard submittal transmittal form, an electronic copy of which is available from the Owner. A submittal without the form or where applicable items on the form are not completed will be returned for resubmittal.

D. Organization

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components.

2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, drawing number, detail number, schedule title, room number, or building name, as applicable.

3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

E. Format

1. Minimum sheet size shall be 8-1/2 inches by 11-inches. Maximum sheet size shall be 11-inches by 17-inches. Every page in a submittal shall be numbered in sequence. All sheets shall be submitted on one (1) pdf file and arranged.

2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.

3. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number followed by a decimal point and a “1” to indicate it is an original (first) submittal. (For example, if submittal number 16.1 requires a resubmittal, that resubmittal will bear the designation “16.2”. A further resubmittal would bear the designation “16.3”, etc.

F. Disorganized submittals that do not meet the requirements of the Contract Documents will be returned without review.

G. Except as may otherwise be indicated, the Engineer will return email comments (in pdf format) of each submittal to the Owner’s RPR with comments noted thereon,

within 14 calendar Days following receipt by the Engineer. The Owner's RPR will compile all comments and return the complete submittal (in pdf format), within 21 calendar days following original receipt by the Owner's RPR. It is considered reasonable that the Contractor will make a complete and acceptable submittal to the Owner's RPR by the first resubmittal on an item. The Owner reserves the right to withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the first resubmittal. The Engineer's and Owner RPR's combined maximum review period for each submittal or resubmittal will be 21 calendar Days. Thus, for a submittal that requires two (2) resubmittals before it is complete, the maximum review period could be 63 calendar Days.

H. Submittal Review Marking

1. NO EXCEPTIONS TAKEN. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission will not be required.

2. MAKE CORRECTIONS NOTED. If a submittal is returned marked "MAKE CORRECTIONS NOTED," Contractor shall make the corrections on the submittal, but formal revision and resubmission will not be required.

3. REVISE-RESUBMIT. If a submittal is returned marked "REVISE-RESUBMIT," the Contractor shall revise it and shall resubmit the required number of copies. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as "REVISE - RESUBMIT," the submittal as a whole is deemed "REVISE - RESUBMIT," and all 10 drawings are required to be resubmitted.

4. REJECTED-RESUBMIT. If a submittal is returned marked "REJECTED-RESUBMIT," it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with Section 01 60 00 - Products, Materials, Equipment, and Substitutions. In the first two (2) cases, the Contractor shall prepare a new submittal and shall resubmit. In the latter case, the Contractor shall submit the substitution request according to Section 01 60 00 – Product, Materials, Equipment, and Substitutions.

I. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

J. Fabrication of an item may commence only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of

the Contract Documents and shall not be taken as changes to the contract requirements.

K. Submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission to the Engineer. Each submittal shall be dated and signed by the Contractor as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted on the transmittal sheet. The Engineer will only review submittals that have been so verified by the Contractor. Non-verified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.

L. Corrections or comments made on the Contractor's Shop Drawings during review do not relieve the Contractor from compliance with Contract Drawings and Specifications. Review is for conformance to the design concept and general compliance with the Contract Documents only. The Contractor is responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating Work with the trades, and satisfactory and safe performance of the Work.

1.4 SAMPLES

A. The Contractor shall submit the number of samples indicated by the Specifications. If the number is not indicated, submit not less than three (3) samples. Where the amount of each sample is not indicated, submit such amount as necessary for proper examination and testing by the methods indicated.

B. Samples shall be individually and indelibly labeled or tagged, indicating the salient physical characteristics and manufacturer's name. Upon acceptance by the Engineer, one set of the samples will be stamped and dated by the Engineer and returned to the Contractor, one set of samples will be retained by the Owner, and one set shall remain at the Site in the Owner RPR’s field office until completion of the Work.

C. Unless indicated otherwise, the Owner will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines. If certain samples represent non-standard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the Contractor shall clearly state so on the transmittal page of the submittal.

1.5 TECHNICAL MANUAL

A. The Contractor shall submit technical operation and maintenance information for each item of mechanical, electrical, and instrumentation equipment in an organized manner in the Technical Manual. It shall be written so that it can be used and understood by the Owner's operation and maintenance staff.

B. Schedule

1. Work under this Contract involves start-up and commissioning of equipment. Manuals shall be complete for each piece of equipment prior to placing equipment into service and final acceptance of the equipment by the Owner. Except where indicated otherwise, manuals shall be submitted for review in final form a minimum of 10 Days prior to the start of performance testing for each piece of equipment. Discrepancies found by the Owner or Engineer shall be corrected within 30 Days from the date of written notification by the Owner's RPR.

1.6 SPARE PARTS LIST

A. The Contractor shall furnish to the Owner spare parts information for mechanical, electrical, and instrumentation equipment. The spare parts list shall include those spare parts that each manufacturer recommends be maintained by the Owner in inventory.

1. Sources and Pricing: The spare parts list shall include a current list price of each spare part. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to assist the Owner in ordering.

1.7 QUALITY CONTROL (QC) SUBMITTALS

A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the Owner and Engineer that the Contractor has satisfied certain requirements of the Contract Documents.

B. Unless otherwise indicated, QC submittals shall be submitted:

1. Before delivery and unloading, for the following types of submittals:

a. manufacturers' installation instructions;

b. manufacturers' and Installers' experience qualifications;

c. affidavits and manufacturers' certification of compliance with indicated product requirements;

d. laboratory analysis results;

e. factory test reports;

f. ready mix concrete delivery tickets; and,

g. design calculations.

2. Within 30 Days of the event documented for the following types of submittals:

    a. manufacturers' field representative certification of proper installation;

    b. field measurement;

    c. field test reports;

    d. receipt of permit; and,

    e. receipt of regulatory approval.

C. The Owner’s RPR and Engineer will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

1.8 INFORMATIONAL SUBMITTALS

A. Informational submittals, such as Requests for Information (RFI), Deviation Request (DR), Change Order Proposals (COR), etc. formalize the flow of information between the Contractor and the Engineer. The Owner’s standard forms will be employed for such purpose. Electronic copies of all standard Construction Management forms shall be provided by the Owner to the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

Table 3-1. List of Submittals

ID	Clause or Section Title	Submittals Required	Due Data or Delivery Time
01 33 00-1	Contractor Submittals	Preconstruction Conference Submittals	At the preconstruction conference
01 60 00-1	Products, Materials, Equipment, and Substitutions	Substitution Request Form(s)	At the preconstruction conference
01 77 00-1	Project Closeout	Written guarantees, where required	Prior to requesting final payment.
01 77 00-2	Project Closeout	Technical Manuals and Instructions	Prior to requesting final payment.
01 77 00-3	Project Closeout	New Permanent Cylinders and Key Blanks	Prior to requesting final payment.
01 77 00-4	Project Closeout	Maintenance Stock Items; Spare Parts; Special Tools	Prior to requesting final payment.
01 77 00-5	Project Closeout	Bonds for Roofing, Maintenance, etc., as required;	Prior to requesting final payment.
01 77 00-6	Project Closeout	Certificates of inspection and acceptance by local governing agencies having jurisdiction	Prior to requesting final payment.

01 77 00-7	Project Closeout	Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.	Prior to requesting final payment.
26 00 05-1	Electrical Work, General	Shop Drawings	Prior to procurement
26 00 05-2	Electrical Work, General	Technical manuals	Prior to requesting final payment.
26 00 05-3	Electrical Work, General	Record Drawings	Prior to requesting final payment.
26 05 83-1	Wire & Cable	Field Test Results	Prior to procurement
26 29 23-1	Variable Frequency Drives	Shop Drawings	Prior to procurement
26 29 23-2	Variable Frequency Drives	Technical Manual	Prior to requesting final payment.
26 29 23-3	Variable Frequency Drives	Training Materials	Prior to requesting final payment.
26 29 23-4	Variable Frequency Drives	Spare Parts List	Prior to requesting final payment.
26 29 23-5	Variable Frequency Drives	Test Procedures	Prior to requesting final payment.
26 29 23-6	Variable Frequency Drives	O&M Data	Prior to requesting final payment.
26 29 23-7	Variable Frequency Drives	Programming Data	Prior to requesting final payment.

– END OF SECTION –

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SECTION 01 56 00 – PROTECTION OF EXISTING FACILITIES

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

1.2 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The Contractor shall protect underground Utilities and other improvements which may be impaired during construction operations. The Contractor shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

C. Utilities to be Removed: Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the Contractor in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

D. Owner's Right of Access: The right is reserved to the Owner and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.

E. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement owner before being concealed by backfill or other work.

F. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication

wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.3 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three (3) Days nor more than seven (7) Days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

– END OF SECTION –

SECTION 01 60 00 – PRODUCTS, MATERIALS, EQUIPMENT, AND SUBSTITUTIONS

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall provide products, materials, equipment, and substitutions in accordance with the Contract Documents.

1.2 DEFINITIONS

A. The word "Products," as used in the Contract Documents is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the project or taken from Contractor's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form Work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the Work.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 - Contractor Submittals.

B. Substitution Request Form(s)

1.4 QUALITY CONTROL

A. Source Limitations: To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.5 PRODUCT DELIVERY AND STORAGE

A. The Contractor shall deliver and store the Work in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the Contractor shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.6 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.

C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.7 STORAGE AND PROTECTION

A. Products shall be stored in accordance with the manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate-controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

C. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are maintained under required conditions.

D. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.8 MAINTENANCE OF PRODUCTS IN STORAGE

A. Stored products shall be periodically inspected on a scheduled basis. The Contractor shall maintain a log of inspections and shall make the log available on request.

B. The Contractor shall comply with manufacturer's product storage requirements and recommendations.

C. The Contractor shall maintain manufacturer-required environmental conditions continuously.

D. The Contractor shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

E. For mechanical and electrical equipment, the Contractor shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

F. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to final acceptance by the Owner in accordance with the Contract Documents.

1.9 PROPOSED SUBSTITUTIONS OR "OR-EQUAL" ITEM

A. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular manufacturer, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other manufacturers may be accepted if sufficient information is submitted by the Contractor to allow the Engineer to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitution product, material or equipment shall be upon the Contractor.

2. The Engineer will be the sole judge as to the type, function, and quality of any such substitution and the Engineer's decision shall be final.

3. The Engineer may require the Contractor to furnish additional data about the proposed substitution.

4. The Owner may require the Contractor to furnish a special performance guarantee or other surety with respect to any substitution.

5. Acceptance by the Engineer of a substitution item proposed by the Contractor shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents and for adequacy of the substitution.

6. The Contractor shall pay all costs of implementing accepted substitutions, including redesign and changes to Work necessary to accommodate the substitution.

B. The procedure for review by the Engineer will include the following:

1. If the Contractor wishes to provide a substitution item, the Contractor shall make a written application to the Engineer on the "Substitution Request Form."

2. Unless otherwise provided by law or authorized in writing by the Engineer, the "Substitution Request Form(s)" shall be submitted within the 35 Day period after award of the Contract.

3. Wherever a proposed substitution item has not been submitted within said 35 Day period, or wherever the submission of a proposed substitution material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment indicated in the Contract Documents.

4. The Contractor shall certify by signing the form that the list of paragraphs on the form are correct for the proposed substitution.

5. The Engineer will evaluate each proposed substitution within a reasonable period of time.

6. As applicable, no shop drawing submittals shall be made for a substitution item nor shall any substitution item be ordered, installed, or utilized without the Engineer's prior written acceptance of the Contractor's "Substitution Request Form."

7. The Engineer will record the time required by the Engineer in evaluating substitutions proposed by the Contractor and in making changes by the Contractor in the Contract Documents occasioned thereby.

C. The Contractor's application shall address the following factors which will be considered by the Engineer in evaluating the proposed substitution:

1. Whether the evaluation and acceptance of the proposed substitution will prejudice the Contractor's achievement of Substantial Completion on time.

2. Whether acceptance of the substitution for use in the Work will require a change in any of the Contract Documents to adapt the design to the proposed substitution.

3. Whether incorporation or use of the substitution in connection with the Work is subject to payment of any license fee or royalty.

4. Whether all variations of the proposed substitution from the items originally specified are identified.

5. Whether available maintenance, repair, and replacement service are indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.

6. Whether an itemized estimate is included of all costs that will result directly or indirectly from acceptance of such substitution, including cost of redesign and claims of other contractors affected by the resulting change.

7. Whether the proposed substitute item meets or exceeds the experience and/or equivalency requirements listed in the appropriate technical specifications.

D. Without any increase in cost to the Owner, the Contractor shall be responsible for and pay all costs in connection with proposed substitutions and of inspections and testing of equipment or materials submitted for review prior to the Contractor's purchase thereof for incorporation in the Work, whether or not the Engineer accepts the proposed substitution or proposed equipment or material. The Contractor shall reimburse the Owner for the charges of the Engineer for evaluating each proposed substitution.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

– END OF SECTION –

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SECTION 01 77 00 – PROJECT CLOSEOUT

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall provide project closeout activities in accordance with the Contract Documents.

1.2 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed Work all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily performed the final cleanup of the Site.

1.3 CLOSEOUT TIMETABLE

A. The Contractor shall establish dates for equipment testing, acceptance periods, and on-site instructional periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the Owner, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.4 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

B. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:

1. written guarantees/warranty, where required;
2. technical Manuals and instructions;
3. new permanent cylinders and key blanks for all locks;
4. maintenance stock items; spare parts; special tools;
5. bonds for roofing, maintenance, etc., as required;
6. certificates of inspection and acceptance by local governing agencies having jurisdiction; and,
7. releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.5 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with the maintenance and guarantee requirements contained in Article 13 of the General Conditions.

B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work, and the Contractor and its surety shall be liable to the Owner for the cost thereof.

1.6 BOND

A. The Contractor shall provide a bond to guarantee performance of the provisions contained in Paragraph "Maintenance and Guarantee" above, and Article 13 of the General Conditions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

– END OF SECTION –

SECTION 26 05 00 – ELECTRICAL WORK, GENERAL

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide electrical WORK, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section apply to all sections in Division 26, except as indicated otherwise.

C. The WORK of this Section is required for operation of electrically-driven equipment provided under specifications in other Divisions. The CONTRACTOR'S attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of Section 26 29 23 Variable Frequency Drives.

D. Equipment supports and foundations shall be in conformance with manufacturer instructions and requirements.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

NFPA 70	National Electrical Code
NETA	International Electrical Testing Association
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)
NSF/ANSI 61	Drinking Water System Components – Health Effects

B. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.

C. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards (29 CFR 1910 and 29 CFR 1926, as applicable), state building standards, and applicable local codes and regulations.

D. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.3 SIGNAGE AND MARKINGS

A. **Identification**: Provide danger, caution, and warning signs and equipment identification markings in accordance with applicable federal and state OSHA and NEC requirements.

B. Local Disconnect Switches

1. Each local disconnect switch for motors and equipment shall be legibly marked to indicate its purpose unless the purpose is indicated by the location and arrangement.

1.4 PERMITS AND INSPECTION

A. Permits shall be obtained and inspection fees shall be paid according to the General Conditions.

1.5 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

B. **Shop Drawings:** Include the following:

1. complete material lists stating manufacturer and brand name of each item or class of material;

2. front, side, rear elevations, and top views with dimensional data;

3. connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers;

4. method of anchoring, seismic requirements, weight, and leveling criteria;

5. types of materials and finish;

6. nameplates;

7. temperature limitations, as applicable;

8. voltage requirement, phase, and current, as applicable;

9. front and rear access requirements;

10. grounding requirements;

11. Catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material. Catalog data sheets shall be stamped to indicate the project name, applicable Section and paragraph, model number, and options; and,

12. Tests: Where test reports are indicated, proof of design test reports for mass-produced equipment shall be submitted with the Shop Drawings, and factory performance test reports for custom-manufactured equipment shall be submitted and be approved prior to shipment. Field test reports shall be submitted for review prior to Substantial Completion.

C. **Technical Manuals:** Complete information in accordance with Section 01 33 00 – Contractor Submittals.

D. **Record Drawings:** The CONTRACTOR shall show invert and top elevations and routing of duct banks and concealed below-grade electrical installations. Record drawings shall be prepared, be available to the ENGINEER, and be submitted according to Section 01 33 00 – Contractor Submittals.

1.6 TESTS

A. The CONTRACTOR shall be responsible for factory and field tests required by specifications in Division 26 and by the ENGINEER or other authorities having jurisdiction. The CONTRACTOR shall furnish necessary testing equipment and pay costs of tests, including replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of faulty installation.

B. Where test reports are indicated, proof of design test reports for mass-produced equipment shall be submitted with the Shop Drawings, and factory performance test reports for custom-manufactured equipment shall be submitted and be approved prior to shipment. Field test reports shall be submitted for review prior to Substantial Completion.

C. Equipment or material that fails a test shall be removed and replaced or if the ENGINEER approves, may be repaired and retested for compliance. Corrections to equipment or materials with a factory warranty shall be as recommended by the manufacturer and shall be done in a manner that does not void the warranty.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Equipment and materials shall be new, shall be listed by UL, and shall bear the UL label where UL requirements apply. Equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the WORK shall be products of the same manufacturer. Equipment and materials shall be of industrial grade standard of construction.

2.2 MOUNTING HARDWARE

A. Miscellaneous Hardware

1. Nuts, bolts, and washers shall be stainless steel.

2. Threaded rods for trapeze supports shall be continuous threaded galvanized steel, 3/8-inch diameter minimum.

3. Strut for mounting of conduits and equipment shall be galvanized steel or stainless steel. Where contact with concrete or dissimilar metals may cause galvanic corrosion, suitable non-metallic insulators shall be utilized to prevent such corrosion. Strut shall be as manufactured by **Unistrut, B-Line**, or equal.

4. Anchors for attaching equipment to concrete walls, floors, and ceilings shall be stainless steel expansion anchors, such as **"Rawl-Bolt," "Rawl-Stud"** or **"Lok-**

Bolt" as manufactured by **Rawl,** similar by **Star,** or equal. Wood plugs shall not be permitted.

2.3 ELECTRICAL IDENTIFICATION

A. **Nameplates:** Nameplates shall be fabricated from white-letter, black-face laminated plastic engraving stock, **Formica Type ES-1** or equal. Each shall be fastened securely, using fasteners of brass, cadmium-plated steel, or stainless steel, screwed into inserts or tapped holes as required. Engraved characters shall be block style with no characters smaller than 1/8-inch top to bottom.

B. **Conductor and Equipment Identification:** Conductor and equipment identification devices shall be either imprinted plastic-coated cloth marking devices such as manufactured by **Brady, Thomas & Betts,** or equal, or shall be heat-shrink plastic tubing, imprinted split-sleeve markers cemented in place, or equal.

PART 3 -- EXECUTION

3.1 GENERAL

A. **Incidentals:** The CONTRACTOR shall provide materials and incidentals required for a complete and operable system, even if not required explicitly by the Contract Documents. Typical incidentals are terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor-furnished equipment to connect with other equipment indicated in the Contract Documents.

B. **Field Control of Location and Arrangement:** Exact locations shall be determined by the CONTRACTOR in the field based on the physical size and arrangement of equipment, finished elevations, and other obstructions.

1. Conduit and equipment shall be installed in such a manner as to avoid obstructions, to preserve headroom, and keep openings and passageways clear. If equipment is installed without instruction and must be moved, it shall be moved without additional cost to the OWNER.

C. **Workmanship:** Materials and equipment shall be installed in strict accordance with printed recommendations of the manufacturer. Installation shall be accomplished by workers skilled in the WORK. Installation shall be coordinated in the field with other trades to avoid interferences.

D. **Protection of Equipment and Materials:** The CONTRACTOR shall fully protect materials and equipment against damage from any cause. Materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint. Moving parts shall be kept clean and dry. The CONTRACTOR shall replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections as part of the WORK.

3.2 EQUIPMENT ANCHORING

A. Floor-supported, wall, or ceiling-hung equipment and conductors shall be anchored in place by methods that will meet seismic requirements in the area where the project is located.

B. Anchoring methods and leveling criteria in the printed recommendations of the equipment manufacturers are a part of the WORK of this Contract. Such recommendations shall be submitted as Shop Drawings under Section 01 33 00 – Contractor Submittals.

3.3 EQUIPMENT IDENTIFICATION

A. **General:** Equipment and devices shall be identified as follows:

1. Nameplates shall be provided for panelboards, control and instrumentation panels, starters, switches, and pushbutton stations. In addition to nameplates, control devices shall be equipped with standard collar-type legend plates.

2. Control devices within enclosures shall be identified as indicated. Identification shall be similar to the subparagraph above.

3. Toggle switches that control loads out of sight of switches and multi-switch locations of more than two (2) switches shall have suitable labeled finish plates.

4. Equipment names and tag numbers, where indicated on the Drawings, shall be utilized on nameplates.

5. The CONTRACTOR shall furnish typewritten circuit directories for panelboards; circuit directory shall accurately reflect the outlets connected to each circuit.

6. Termination points on terminal blocks shall be labeled by identifiers on the blocks. Identifiers shall be preprinted by the terminal manufacturer or custom-printed. Hand lettered markers will not be acceptable.

7. Distribution equipment, stand-alone disconnects, starters, and VFDs shall be tagged with appropriate arc-flash labels.

3.4 CLEANING

A. Before final acceptance, the electrical WORK shall be thoroughly cleaned. Exposed parts shall be thoroughly cleaned of cement, plaster, and other materials. Temporary tags, markers, stickers, etc. shall be removed. Oil and grease spots shall be removed with a non-flammable cleaning solvent. Such surfaces shall be carefully wiped and cracks and corners scraped out. Touch-up paint shall be applied to scratches on panels and cabinets. Electrical cabinets or enclosures shall be vacuum-cleaned.

B. Light fixtures shall be cleaned inside and out.

C. Debris and refuse from cleaning shall be disposed of off the Site.

- END OF SECTION -

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SECTION 26 05 83 - WIRE AND CABLE

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide wire and cable, complete and operable, in accordance with the Contract Documents.

B. In the event that motors provided are larger horsepower than the motors indicated, raceways, conductors, starters, overload elements, and branch circuit protectors shall be revised as necessary to control and protect the increased motor horsepower in accordance with Section 26 05 10 – Electric Motors. Revisions are part of the WORK of this Section.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. ASTM

a. ASTM B33 Standard Specification for Tin-Coated Soft or Annealed Copper Wire

2. IEEE

a. IEEE 1202 Flame-Propagation Testing of Wire and Cable

3. Underwriters Laboratories, Inc. (UL):

a. UL 44 Standard for Thermoset-Insulated Wire and Cable

b. UL 1277 Type TC-ER Standard Power and Control Cables

c. UL 2277 Flexible Motor Supply and Wind Turbine Tray Cable

d. UL 1685 Standard for Safety Vertical-Tray Fire-Propagation Test for Electrical and Optical Fiber Cables

4. National Fire Protection Agency (NFPA):

a. NFPA 70 National Electric Code

5. National Electrical Manufacturers Association (NEMA):

a. NEMA WC70 Non-shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; Insulated Cable Engineers Association, Inc. (ICEA) S-95-658

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Sections 01 33 00 – Contractor Submittals and 26 05 00 – Electrical Work, General.

1. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the ENGINEER for review and acceptance.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Conductors, include grounding conductors, shall be copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. Conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of NFPA 70-National Electric Code, Article 310, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

B. Wire rated for 600 volts in duct or conduit for power and lighting circuits shall be Class B Type XHHW cross-linked polyethylene conforming to UL-44 - UL Standard for Thermoset-Insulated Wires and Cables. THHN/THWN wire shall not be permitted to be used for any power or control wiring in this project, except as specifically permitted within control panels per Section 40 90 18 – Control Panels.

C. Materials, constructions, and tests are to conform to the requirements of NEMA WC70-Non-shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; Insulated Cable Engineers Association, Inc. (ICEA) S-95-658 and meet the flame tests of UL 1685- Standard for Safety Vertical-Tray Fire-Propagation Test for Electrical and Optical Fiber Cables and IEEE 1202- Flame-Propagation Testing of Wire and Cable.

D. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 3 percent at the farthest outlet of power, heating, and lighting loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

E. Conductors for branch circuits as defined in Article 100 of the NEC, shall be sized to prevent voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

2.2 LOW VOLTAGE WIRE AND CABLE

A. Variable Frequency Drive (VFD) Motor Cable

1. Flexible stranded tinned annealed copper for VFD motor cable shall meet the requirements of ASTM B33- Standard Specification for Tin-Coated Soft or Annealed

Copper Wire, UL 1277-Type TC-ER Standard Power and Control Cables, and UL 2277- Flexible Motor Supply and Wind Turbine Tray Cable

2. Provide VFD motor cable with:

   a. Conductor: Class K, flexible stranded tinned annealed copper. Sized for 50HP motor application.

   b. Insulation: XHHW-2

   c. Ground: One green ground

   d. Drain Wire: Tinner copper

   e. Twisted Shielded Pair: 100% aluminum/Mylar foil coverage

   f. Shielding: 100% aluminum/Mylar/aluminum foil, 85% coverage tinned copper braid

   g. Jacket: Thermoplastic Elastomer (TPE)

2.3 CABLE TERMINATIONS

A. Compression connectors shall be **Burndy Hi Lug, Thomas & Betts Sta-Kon,** or equal. Threaded connectors shall be split bolt type of high strength copper alloy. Pressure type, twist-on connectors will not be acceptable.

B. Pre-insulated fork tongue lugs shall be **Thomas & Betts, Burndy,** or equal.

C. General purpose insulating tape shall be **Scotch No. 33, Plymouth Slip-knot,** or equal. High temperature tape shall be polyvinyl as manufactured by **Plymouth, 3M,** or equal.

D. Labels for coding 600-volt wiring shall be computer printable or pre-printed, self-laminating, self-sticking, as manufactured by **W.H. Brady, 3M,** or equal.

PART 3 -- EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall provide and terminate power, control, and instrumentation conductors except where indicated.

3.2 INSTALLATION

A. Conductors shall not be pulled into raceway until raceway has been cleared of moisture and debris.

B. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.

C. Instrumentation wire shall not be run in the same raceway with power and control wiring except where specifically indicated.

D. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps and shall be fanned out to terminals.

E. Single conductor cable in cable trays shall be No. 1/0 or larger and shall be of a type listed and marked for use in cable trays. Tray cable smaller than 1/0 shall be multi-conductor, with outer jacket.

3.3 SPLICES AND TERMINATIONS

A. General

1. Wire taps and splices shall be properly taped and insulated according to their respective classes.

2. In general, there shall be no cable splices in underground manholes or pullboxes. If splices are necessary, the cables shall be brought aboveground and terminated in a NEMA 4X stainless steel terminal or splice cabinet on a concrete pad. Splices in underground manholes and pullboxes may be made only with the approval of the ENGINEER.

3. Stranded conductors shall be terminated directly on equipment box lugs making sure that conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.

4. Excess control and instrumentation wires shall be long enough to terminate at any terminal block in the enclosure, be properly taped, be identified with origin, and be neatly coiled.

B. Instrumentation Wire and Cable

1. Shielded instrumentation cables shall be grounded at one end only, preferably the receiving end on a 4 - 20 mA system.

2. Two (2) and three (3) conductor shielded cables installed in conduit runs which exceed available standard cable lengths may be spliced in pullboxes. Such cable runs shall have only one (1) splice per conductor.

C. Power Wire and Cable

1. 120/208-volt, 120/240-volt, and 480/277-volt branch circuit conductors may be spliced in suitable fittings at locations determined by the CONTRACTOR. Cables rated above 2,000 volts shall be spliced or terminated only at equipment terminals indicated.

2. Splices to motor leads in motor terminal boxes shall be wrapped with mastic material to form a mold and then shall be taped with a minimum of two (2) layers of varnished cambric tape overtaped with a minimum of two (2) layers of high temperature tape.

3.4 CABLE IDENTIFICATION

A. **General:** Wire and cable shall be identified for proper control of circuits and equipment and to reduce maintenance effort.

B. **Identification Numbers:** The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3-inches of conductor terminals. "Control Conductor" shall be defined as any conductor used for alarm, annunciator, or signal purposes.

1. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.

2. 480/277-volt system conductors shall be color coded as follows: Phase A - Brown, Phase B - Orange, Phase C - Yellow, and Neutral - Gray. Color coding tape shall be used where colored insulation is not available. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Color coding and phasing shall be consistent throughout the Site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs. Any phase changes necessary for proper rotation shall be made at the driven equipment and not in the local disconnect.

3. General purpose AC control cable shall be red. General purpose DC control cable shall be blue.

4. Spare cable shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.

5. Terminal strips shall be identified by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

3.5 TESTING

A. **Cable Assembly and Testing:** Cable assembly and testing shall comply with applicable requirements of NEMA WC70 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. Factory test results shall be submitted in accordance with Section 01 33 00 – Contractor Submittals, prior to shipment of cable. The following field tests shall be the minimum requirements:

1. Insulation resistance testing, using a DC megohmeter, shall be performed on cables operating at more than 2,000 volts to ground. Time-resistance readings shall be taken and recorded at intervals of 30 seconds and one (1) minute. Time-resistance voltage levels shall be per the cable manufacturer's recommendations.

2. Power cable rated at 600 volts shall be tested for insulation resistance between phases and from each phase to a ground using a megohmeter.

3. Field testing shall be done after cable is installed in the raceways.

4. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the ENGINEER for review and acceptance.

5. Cables failing the tests shall be replaced with a new cable or be repaired. Repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.

B. **Continuity Test:** Control and instrumentation cable shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cable in service.

- END OF SECTION -

SECTION 26 29 23 – VARIABLE FREQUENCY DRIVE UNITS

PART 1 -- GENERAL

1.1 SUMMARY

A. General

1. Demo the existing variable frequency drive (VFD) unit for Well Pump #4

2. Provide one VFD unit complete and operable.

3. It is the intent of this Section to require complete, reliable, and fully tested variable frequency drive systems suitable for attended or unattended operation.

B. The requirements of Section 26 05 00 – Electrical Work, General, apply to the WORK of this Section.

C. Single Manufacturer

1. Like products shall be the end product of one (1) manufacturer in order to standardize appearance, operation, maintenance, spare parts, and manufacturer's services.

2. This requirement, however, does not relieve the CONTRACTOR of overall responsibility for the WORK.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. National Fire Protection Association - NFPA 70 - US National Electrical Code.

2. National Electrical Manufacturers Association

a. NEMA ICS 1 Standard for Industrial Control and Systems (2022)

b. NEMA ICS 6 Industrial Control and Systems: Enclosures (1993, R2016)

c. NEMA ICS 7 Adjustable-Speed Drives (2020)

d. NEMA ICS 7.2 Application Guide for AC Adjustable Speed Drive Systems (2021)

e. NEMA ICS 61800-2 Adjustable Speed Electrical Power Drive Systems Part 2: General Requirements - Rating Specifications for Low Voltage Adjustable Frequency A.C. Power Drive Systems (2005)

f. NEMA 250 Enclosures for Electrical Equipment (2020)

3. ANSI/NETA

a. NETA/ATS Acceptance Testing Specifications for Electrical Power Equipment and Systems

4. Underwriters Laboratory Inc.

a. UL 508 Standard for Safety Industrial Control Panels

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals, except that Shop Drawing information for the drives shall be submitted as part of the information for the driven equipment.

B. Shop Drawings: Include the following information:

1. Equipment Information:

a. Elevation Drawings: Include dimensional information and conduit routing locations.

b. Unit Descriptions: Include amperage ratings, enclosure ratings, fault ratings, nameplate information, etc. as required for approval.

c. Wiring Diagrams:

1) Power Diagram: Include amperage ratings, circuit breaker frame sizes, circuit breaker continuous amp ratings, etc. as required for approval.

2) Control Diagram: Include disconnect devices, pilot devices, etc.

d. Major components list.

e. Circuit breaker type, frames, and settings.

f. Information related to relays, timers, pilot devices, control transformer VA, and fuse sizes, including catalog cuts.

g. Submittals with drawings not meeting this requirement will not be reviewed further and will be returned to the CONTRACTOR stamped "REJECTED".

2. Factory test data certifying compliance of similar equipment from the same manufacturer with requirements of this Section.

C. The Technical Manual shall include the following documentation:

1. Harmonic analysis report;

a. Corrective measures shall be submitted for action by the ENGINEER.

2. Field test report.

3. Programming procedure and program settings.

D. Proposed training materials for the instruction of the OWNER's personnel shall be submitted for review, and comments shall be incorporated.

E. Spare Parts List:

1. Submit information for parts required by this Section plus any other spare parts recommended by the controller manufacturer.

F. Test procedures per the manufacturer's standards.

G. Operation and Maintenance Data:

1. Service and Contact information

2. VFD and Operator Interface User Manuals

3. Troubleshooting / Service Manuals

H. Submit records of programming data in the equipment Technical Manual, including setup and protective settings.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall coordinate the shipping of equipment with the manufacturer.

B. Contractor shall store the equipment in a clean and dry space at an ambient temperature range of -40 °C to 70 °C (-40 °F to 158 °F).

C. The contractor shall protect the units from dirt, water, construction debris and traffic.

1.5 WARRANTY

A. The manufacturer shall provide their standard parts warranty for eighteen (18) months from the date of shipment or twelve (12) months from the date of being energized, whichever occurs first.

B. This warranty applies to variable-frequency drive systems.

PART 2 -- PRODUCTS

2.1 General

A. The CONTRACTOR shall provide a total of ONE variable frequency drives. Provide Allen-Bradley – PowerFlex 753 (no substitutions).

1. The VFD shall be purchased from the authorized Allen-Bradley retailer for the geographic location where the project is located.

2. The VFD and VFD Enclosure shall contain the following equipment

a. PF753 50HP ND 480 VAC in NEMA 12 Enclosure

1) Qty 1 – Power Flex 753 AC Drive, with, with Embedded I/O, Standard Protection, Forced Air, AC Input with DC Terminals, Open Type, 65 Amps, 50HP ND,480 VAC, 3 PH, Frame 4, Filtered, CM jumper installed (preferred), DB Transistor.

2) Qty. 1- 20-HIM-C6S Door Mounted Full Numeric LCD HIM

3) Qty. 1- PF750-115V I/O Module-2AI,2AO,6DI,2RO

4) Qty. 1- Input Circuit Breaker Disconnect w/ Lockable Flanged Handle

5) Qty. 1- Control Power Transformer, Fused Primary/Secondary

6) Qty. 1- Two Contactor Bypass (IEC style) w/ Overload Relay

7) Qty. 1- Fault Control Relay, 120 VAC

8) Qty. 1- Door Mounted Start Push Button (800H Style)

9) Qty. 1- Door Mounted Stop Push Button (800H Style)

10) Qty. 1- Door Mounted Drive/Off/Bypass Selector Switch (800H Style)

11) Qty. 1- Door Mounted Bypass Pilot Light (Amber 800H LED style)

12) Qty. 1- Input Transient Voltage Surge Suppression

13) Enclosure Fan & Filter Kit

2.2 EQUIPMENT REQUIREMENTS

A. General

1. The power supply shall be an adjustable frequency inverter designed to convert incoming 3-phase, 480-volt, 60-Hertz power to a DC voltage and then to adjustable frequency AC by use of a 3-phase inverter.

2. Current-source inverters will not be accepted.

3. Inverters shall be sized to match the kVA and inrush characteristics of the existing 50HP.

B. Inverter

1. The inverter shall be of a voltage-source design, producing a pulse-width-modulated type output.

2. Inverters shall be capable of delivering the nameplate horsepower exclusive of service factor without the need for mandatory thermostats or feedback tachometers.

3. The VFD shall vary both the AC voltage and frequency simultaneously in order to operate the motor at required speeds.

4. The minimum VFD inverter efficiency shall be 95 percent at 100 percent speed and load, and 85 percent efficiency at 50 percent speed and load.

C. The VFD shall be provided with the following features:

1. Hardware

a. Utilize diode bridge or SCR bridge on the input rectifier.

b. Utilize DC bus inductor on all six-pulse VFDs only.

c. Utilize switching logic power supply operating from the DC bus.

d. Incorporate phase-to-phase and phase-to-ground MOV protection on the AC input line.

e. Microprocessor based inverter logic shall be isolated from power circuits.

f. Utilize latest generation IGBT inverter section.

g. Battery receptacle for Lithium battery power to the Real-time Clock.

h. Dedicated Digital Input for hardware enable.

i. Conformal coated printed circuit boards.

2. Control Logic

a. Ability to operate with motor disconnected.

b. Provide a controlled shutdown, when properly protected, with no component failure in the event of an output phase-to-phase or phase-to-ground short circuit. Provide annunciation of the fault condition.

c. Provide multiple programmable stop modes including Ramp, Coast, DC-Brake, Ramp-to-Hold, Fast Braking, and Current Limit Stop.

d. Provide multiple acceleration and deceleration rates.

e. Adjustable output frequency up to 590 Hz

3. DeviceLogix Control

a. Ability to control outputs and manage status information locally within the VFD.

b. Ability to function standalone or complimentary to supervisory control.

c. Ability to speed reaction time by processing in the VFD.

d. Ability to provide scaling, selector switches, or other data manipulations not already built into the VFD.

e. Ability to read inputs/write outputs and exclusively control the VFD.

f. Ability to provide an option for decision making if communication is lost with main controller.

g. Ability to control other VFDs via a peer-to-peer EtherNet/IP network.

h. Ability to write programs off-line.

4. Motor Control Modes

a. Selectable Sensorless Vector, Flux Vector, V/Hz, and Adjustable Voltage Control modes selectable through programming.

b. The drive shall be supplied with a Start-up and Auto-tune mode.

c. The V/Hz mode shall be programmable for fan curve or full custom patterns.

d. Capable of Open Loop V/Hz.

5. Current Limit

a. Programmable current limit from 20 to 160% of rated output current.

b. Current limit shall be active for all drive states: accelerating, constant speed and decelerating.

c. The drive shall employ PI regulation with an adjustable gain for smooth transition in and out of current limit.

6. Acceleration / Deceleration

a. Accel/Decel settings shall provide separate adjustments to allow either setting to be adjusted from 0 to 3600 seconds.

b. A second set of remotely selectable accel/decel settings shall be accessible through digital inputs.

7. Speed Profiles

a. Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or "S Curve" profiles that provide changing accel/decel rates.

b. S Curve profiles shall be adjustable.

8. Adjustments

a. A digital interface can be used for all set-up, operation and adjustment settings.

b. All adjustments shall be stored in nonvolatile memory (EEPROM).

c. No potentiometer adjustments shall be required.

d. EEPROM memory for factory default values shall be provided.

e. Software must be available for trending and diagnostics, as well as online and offline programming functionality.

9. Process PID Control

a. The drive shall incorporate an internal process PI regulator with proportional and integral gain adjustments as well as error inversion and output clamping functions.

b. The feedback shall be configurable for normal or square root functions. If the feedback indicates that the process is moving away from the set-point, the regulator shall adjust the drive output until the feedback equals the reference.

c. Process control shall be capable of being enabled or disabled with a hardwire input. Transitioning in and out of process control shall be capable of being tuned for faster response by preloading the integrator.

d. Protection shall be provided for a loss of feedback or reference signal.

10. Skip Frequencies

a. Three adjustable set points that lock out continuous operation at frequencies which may produce mechanical resonance shall be provided.

b. The set points shall have a bandwidth adjustable from Maximum Reverse Speed to Maximum Forward Speed.

11. Fault Reset / Run

a. When the drive is running or idle it shall provide up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.

b. The automatic mode shall not be applicable to shorted output faults and other internal microprocessor faults.

c. The time between restarts shall be adjustable from 0.5 seconds to 30 seconds.

12. Power Outage

a. The VFD shall shut down in an orderly manner when a power outage occurs on one or more phases.

b. Upon restoration of power and a START signal, the motor shall restart and run at the speed corresponding to the current process input signal.

13. Run on Power Up

a. A user programmable restart function shall be provided to allow restart of the equipment after restoration of power after long duration power outages. Restart time dependent on presence of incoming signal.

14. Fault Memory

    a. The last 32 fault codes shall be stored and time stamped in a fault buffer.

    b. Information about the drive's condition at the time of the last fault such as operating frequency, output current, dc bus voltage and twenty-seven other status conditions shall be stored.

    c. A power-up marker shall be provided at each power-up time to aid in analyzing fault data.

    d. The last 32 alarm codes shall be stored and time stamped for additional troubleshooting reference.

15. Overload Protection

    a. The drive shall provide internal class 10 adjustable overload protection.

    b. Overload protection shall be speed-sensitive and adjustable.

    c. A viewable parameter shall store the overload usage.

16. Auto Economizer

    a. An auto economizer feature shall be available to automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage.

    b. When the load increases, the drive shall automatically return to normal operation.

17. Terminal Blocks

    a. Separate terminal blocks shall be provided for control and power wiring.

    b. I/O terminal blocks shall be removable with wiring in place.

18. Flying Start

    a. The drive shall be capable of determining the speed and direction of a spinning motor and adjust its output to "pick-up" the motor at the rotating speed. This feature is disabled by default.

19. Inputs and Outputs

    a. The Input / Output option modules shall consist of both analog and digital I/O.

    b. No jumpers or switches shall be required to configure digital inputs and outputs.

c. All digital input and output functions shall be fully programmable.

d. The control terminal blocks shall be rated for 115V AC.

e. Inputs shall be optically isolated from the drive control logic.

f. The control interface card shall provide input terminals for access to fixed drive functions that include start, stop, external fault, speed, and enable.

g. The VFD shall be capable of supporting up to 7 analog inputs, 7 analog outputs, 21 digital inputs, 7 relay outputs, 7 transistor outputs, and 3 positive temperature coefficient (PTC) inputs.

h. The Input / Output option modules shall have the following features:

1) Analog Inputs:

a) Quantity two (2) differentially isolated, ±10V (bi-polar), 88k ohm input impedance, 11 bit plus sign.

b) Analog inputs shall be user programmable for a variety of uses including frequency command and process loop input. Analog inputs shall be user programmable for function scaling (including invert), offset, signal loss detect and square root.

2) Analog Outputs:

a) Quantity two (2) ±10V (bi-polar) / 11 bit & sign, 2 kΩ minimum load, 4-20 mA, 11 bit plus sign, 400 Ω maximum load.

b) The analog output shall be user programmable to be proportional to one of fourteen process parameters including output frequency, output current, encoder feedback, output power.

c) Programming shall be available to select either absolute or signed values of these parameters.

3) Digital Inputs:

a) Quantity of six (6) digital inputs rated 115V AC.

b) All inputs shall be individually programmable for multiple functions including: Start, Run, Stop, Auxiliary Fault, Speed Select, Jog and Process PI functions.

4) Digital Outputs:

a) At least one (1) relay output (N.O. or N.C.).

b) For 240V AC, N.O. contact output ratings shall be 2 amp max., general purpose (inductive)/resistive. N.C. contact output ratings shall be 2 amp max., resistive only.

c) Relays shall be programmable to multiple conditions including: Fault, Alarm, At Speed, Drive Ready and PI Excess Error.

d) Timers shall be available for each output to control the amount of time, after the occurring event, that the output relay actually changes state.

e) At least one (1) transistor output.

f) For 24V DC, transistor output rating shall be 1 amp max, Resistive.

20. Reference Signals

a. The drive shall be capable of using the following input reference signals:

1) Analog inputs

2) Preset speeds

3) Remote potentiometer

4) Digital MOP

5) Human Interface Module

6) Communication modules

21. Loss of Reference

a. The drive shall be capable of sensing reference loss conditions.

b. In the event of loss of the reference signal, the drive shall be user programmable to the following:

1) Fault the drive and coast to stop.

2) Issue a minor fault - allows the drive to continue running while some types of faults are present.

3) Alarm and maintain last reference.

c. When using a communications network to control the drive, the communications adapter shall have these configurable responses to network disruptions and controller idle (fault or program) conditions:

1) Fault

2) Stop

3) Zero Data

4) Hold Last State

5) Send Fault Configuration

22. Metering

    a. At a minimum, the following parameters shall be accessible through the Human Interface Module, if installed:

        1) Output Current in Amps

        2) Output Voltage in Volts

        3) Output Power in kW

        4) Elapsed MWh

        5) DC Bus Voltage

        6) Frequency

        7) Heatsink Temperature

        8) Last eight (32) faults

        9) Elapsed Run Time

        10) IGBT Temperature

23. Faults

    a. At a minimum, the following faults shall be accessible through the Human Interface Module:

        1) Power Loss

        2) Undervoltage

        3) Overvoltage

        4) Motor Overload

        5) Heat Sink Over-temperature

        6) Maximum Retries

        7) Phase-to-phase and Phase to Ground Faults

24. Predictive Diagnostics

    a. At a minimum, the following predictive diagnostic features shall be provided:

        1) Relay Output Life Cycles based on load type and amps.

2) Hours of Fan Life based on load and ambient temperature.

3) Motor Bearing life based on expected hours of use.

4) Motor Lubrication schedule based on hours of use.

5) Machine Bearing life based on expected hours of use.

25. Real-time Clock

a. Shall be capable of providing time stamped events.

b. Shall have the ability to be set locally or via a remote controller.

c. Shall provide the ability to be programmable for month, day, year and local time zones in HH:MM:SS.

26. Programmable Logic Controller Integration

a. The drive shall have the following specific features to enable integration with a Rockwell Automation® ControlLogix® or CompactLogix™ Automation Controller

1) Shall have an Add-on Profile available for use with Rockwell Automation Studio 5000® programming software

2) Shall support Rockwell Automation controller's Automatic Device Configuration functionality

D. The VFD packaged system shall be designed with the following features:

1. Ratings

a. Voltage

1) Capable of accepting nominal plant power of 400, 480, 600V or 690V AC at 50 Hz or 60 Hz.

2) The supply input voltage tolerance shall be ± 10% of nominal line voltage.

b. Displacement Power Factor

1) Six-pulse VFD shall be capable of maintaining a minimum true power factor (Displacement P.F. X Distortion P.F.) of 0.95 or better at rated load and nominal line voltage, over the entire speed range.

2) A minimum of 96.5% (+/- 1%) at 100% speed and 100% motor load at nominal line voltage.

3) Control power supplies, control circuits, and cooling fans shall be included in all loss calculations.

c. Operating ambient temperature range without derating: 0 °C to 40 °C (32 °F to 104 °F)

d. Operating relative humidity range shall be 5% to 95% non-condensing.

e. Operating elevation shall be up to 1000 Meters (3,300 ft) without derating.

2. Sizing

a. Systems rated at Normal Duty loads shall provide 110% overload capability for up to one minute and 150% for up to 3 seconds.

b. Systems rated at Heavy-Duty loads shall provide 150% overload capability for up to one minute and 180% for up to 3 seconds.

3. Auto Reset/Run

a. For faults other than those caused by a loss of power or any other non-critical fault, the drive system shall provide a means to automatically clear the fault and resume operation.

4. Ride-Through

a. The VFD system shall attempt to ride through power dips up to 20% of nominal. The duration of ride-through shall be inversely proportional to load. For outages greater than 20%, the drive shall stop the motor and issue a power loss alarm signal to a process controller, which may be forwarded to an external alarm signaling device.

5. Run on Power Up

a. The VFD system shall provide circuitry to allow for remote restart of equipment after a power outage. Unless indicated in the contact drawings, faults due to power outages shall be remotely resettable. The VFD system shall indicate a loss of power to a process controller, which may be forwarded to an external alarm signaling device. Upon indication of power restoration the process controller will attempt to clear any faults and issue a run command, if desired.

6. Enclosure Door Mounted Human Interface Module (HIM).

a. VFD shall provide a HIM with integral LCD display, operating keys and programming keys.

b. An enclosure door-mounted HIM, rated NEMA/UL Type12, shall be provided.

c. The HIM shall have the following features:

1) A three (3) line by twenty-one (21) character backlit LCD display with graphics capability.

2) Shall indicate drive operating conditions, adjustments and fault indications.

3) Shall be configured to display in the following three distinct zones:

a) The top zone shall display the status of direction, drive condition, fault / alarm conditions and Auto / Manual mode.

b) The middle zone shall display drive output frequency.

c) The bottom zone shall be configurable as a display for either programming menus / information or as a two-line user display for two additional values utilizing scaled units.

4) Shall provide digital speed control.

d. The keypad shall include programming keys, drive operating keys (Start, Stop, Direction, Jog and Speed Control), and numeric keys for direct entry. Electrical equipment provided in addition to the adjustable frequency inverter for each drive shall include:

7. Enclosure

a. Shall be rated NEMA/UL Type 12 and meet the requirements of NEMA 250 – Enclosures for Electrical Equipment

b. Shall be painted per the manufacturer's standard.

c. Shall provide entry and exit locations for power cables.

d. Drive shall contain a label indicating certification to UL in accordance with UL508 compliance

e. The drive system nameplate shall be marked with system Short Circuit Current Rating (SCCR).

8. Drive Enclosure Input Disconnect

a. Provide an enclosure door interlocked disconnect with thermal-magnetic circuit breaker.

b. Operator Handles

1) Provide externally operated main disconnect handle.

2) Handles shall be lockable with up to three lockout / tagout padlock positions.

c. Branch Circuit Protection

1) Input inverse time circuit breaker shall be provided and rated for:

a) 480V

b) 65kAIC

c) 125 Amps

9. Bypass

    a. Manual Bypass Option:

        1) Shall provide a means to manually switch a single motor from drive control to bypass (across the line operation).

        2) Shall provide separate drive output and bypass contactors. The contactors shall be electrically and mechanically interlocked.

        3) Shall provide a Drive/Off/Bypass selector switch, mounted on the enclosure door, for selection of Drive and Bypass modes of operation.

        4) Provide a Class 10 overload for motor protection while operating in the bypass mode.

10. Control Power Transformer

    a. Provide a control power transformer mounted and wired inside of the drive system enclosure.

    b. The transformer shall be rated for the VFD power requirements.

11. Harmonic Mitigation Techniques

    a. Drive Input Line Reactor

        1) Provide a drive input line reactor mounted within the drive system enclosure for drives that are less than 100 horsepower.

        2) The line reactor shall meet the following specifications:

            a) The construction shall be iron core with an impedance of 5 percent

            b) The winding shall be copper or aluminum wound.

            c) The insulation shall be Class H with a 115 °C rise over 50 °C ambient.

            d) The unit shall be rated for system voltage, ampacity, and frequency.

12. Auxiliary Relays

    a. Provide relays for Drive Alarm, Drive Fault, Drive Run, and System Status Faults (as required).

    b. The relays shall be Allen-Bradley 700-HC (2 N.O. & 2 N.C.). The relay contacts shall be rated for 115V AC/30V DC, 5.0 amp resistive, 2.5 amp inductive.

13. Control Interface

a. The control terminals shall be rated for 115V AC.

b. The control interface shall provide input terminals for access to VFD functions that include start, stop, external fault, speed select, and enable, as required.

14. Pilot Lights

a. Provide LED pilot lights, mounted on the enclosure door, for indication of the following status:

1) Bypass – Amber

b. The device shall be an Allen-Bradley Bulletin 800H (30 mm), NEMA Type 13, mounted on the drive system enclosure door.

2.3 SPARE PARTS

A. The CONTRACTOR shall furnish the spare parts listed below, suitably packaged and labeled with the corresponding equipment number.

B. Modified Parts

1. At any time prior to Substantial Completion, the CONTRACTOR shall notify the ENGINEER in writing about any manufacturer's modification of spare part numbers, interchangeabilities, or model changes.

2. If the ENGINEER determines that the modified parts no longer apply to the equipment provided, the CONTRACTOR shall furnish other applicable parts as part of the WORK.

C. The following spare parts shall be furnished:

1. Provide one (1) set of spare power fuses of each form, voltage, and current rating.

2. Provide 10 spare control and power fuses of each type and rating.

3. Provide 10 panel lamps of each type (form, voltage, and current rating).

4. Provide one (1) of each type of circuit board, as applicable:

a. control board;

b. power board;

c. diode bridge; and,

d. transistor module.

5. Provide one (1) of each size and type power diode and transistor.

6. Provide one (1) set of any special tools required for maintenance of the VFD units.

PART 3 -- EXECUTION

3.1 MANUFACTURER'S SERVICES

A. General

1. An authorized service representative of the manufacturer shall be present at the Site for two (2) Days to furnish the services listed below.

2. For the purpose of this Paragraph, a Day is defined as an eight (8) hour period excluding travel time.

B. The authorized service representative shall supervise the following and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:

1. installation of the equipment;

2. inspection, checking, and adjusting the equipment;

3. startup and field testing for proper operation; and,

4. performing field adjustments such that the equipment installation and operation comply with requirements.

C. Instruction of OWNER's Personnel

1. The authorized representative shall instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with test equipment.

2. The instruction shall be specific to the VFD models provided.

3. Training shall be scheduled a minimum of three (3) weeks in advance of the first session.

4. Training shall include one individual session for plant personnel.

5. Proposed training materials shall be submitted for review, and comments shall be incorporated.

6. Training materials shall remain with the trainees.

7. The OWNER may videotape the training for later use with the OWNER's personnel.

3.2 DEMO

a. Field verify and disconnect 480V motor feeder power conductors and conduit but leave for reconnection to new VFD.

b. Demo 115VAC control power wiring from Panelboard 2E.

c. Demo motor power conductors from VFD to Well Pump #4.

d. Disconnect flow meter signal conductors and conduit but leave for reconnection.

e. Demo VFD cabinet.

3.3 INSTALLATION

A. Install new VFD Cabinet per manufacturer printed installation drawings, instructions, and wiring diagrams.

1. Terminate existing 480V power conductors.

2. Terminate existing flow meter signal conductors.

3. Terminate shielded motor power conductors. See 26 05 83 – Wire and Cable

4. Field verify existing conduit locations, provide and modify conduits as necessary for a complete system. See 26 05 00 – Electrical Work, General.

B. Programming

1. The CONTRACTOR shall perform programming of drive parameters required for proper operation of the VFDs included in this project.

2. Submit records of programming data in the equipment Technical Manual, including setup and protective settings.

3.4 FIELD TESTING

A. Testing, checkout, and startup of the VFD equipment in the field shall be performed under the technical direction of the manufacturer's service engineer and meet the manufacturer’s standards, instructions, and the standards of NETA ATS-Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.

B. Under no circumstances shall any portion of the drive system be energized without authorization from the manufacturer's representative.

C. Verify proper operation of control logic in every mode of control.

- END OF SECTION -