

**Rock River Water Reclamation District
Rockford, Illinois**

Bidding Requirements and Contract Forms

for

Substation 3-6 Electrical Upgrades

Capital Project No. 2023

Not to be used for bidding purposes

**Rock River Water Reclamation District
Rockford, Illinois**

**Bidding Requirements and Contract Forms
and
*General Provisions and Technical Specifications***

For

Substation 3-6 Electrical Upgrades

Capital Project No. 2023

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Rockford, Illinois
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Substation 3-6 Electrical Upgrades

Capital Project No. 2023

Section I

Bidding Requirements

**Rock River Water Reclamation District
Rockford, Illinois**

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Article 1 — Notice to Bidders

The Rock River Water Reclamation District (District) will receive sealed and signed bids for the Substation 3-6 Electrical Upgrades, Capital Project No. 1930, at the District office located at 3501 Kishwaukee Street, Rockford, Illinois until 2:00 p.m. on Friday, June 14, 2019 at which time and place responsive / responsible bids will be publicly opened and read aloud.

The Substation 3-6 Electrical Upgrade project consists of installing new 3200A Switchgear and 2500kVA transformers to replace the existing 1600A Power Center 2. The project will include the replacement of Medium-Voltage feeders, Low-Voltage feeders, and the installation of new ductbank from the new Switchgear location to current and future loads, along with all other appurtenances as indicated on the plans and in the specifications.

Testing and commissioning will be completed for all equipment.

Bidder's attention is called to Article 2 – Instructions to Bidders 3.8 requirements for Statement of Qualifications. Bidder must have a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL.

All underground construction, paving, testing, and restoration shall be completed by December 1, 2019. Liquidated damages shall be \$300 per calendar day.

Bid documents may be obtained upon receipt of payment of \$50 per set (non-fundable) by contacting the District Engineering Department at 815-387-7660.

Plans and specifications are also available for viewing through the Northern Illinois Building Contractors Association, whose office is located at 1111 S. Alpine Rd, Rockford, IL. For more information, visit the District website at www.rwrwd.dst.il.us.

All construction will be done in accordance with specifications on file with the District, including the *General Provisions and Technical Specifications for Sanitary Sewer Construction* (Current Edition) by the Rock River Water Reclamation District of Rockford.

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount of ten percent (10%) of the total bid price. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured.

A Mandatory Pre-Bid Meeting for this project will be held on Tuesday, June 4, 2019, at 10:00 a.m. at the RRWRD Board Room, 3501 Kishwaukee Street, Rockford, Illinois. All contractors that intend to bid on this project must attend the pre-bid meeting.

The successful bidder will be required to furnish a satisfactory performance bond in the full amount of the bid or proposal. No bid shall be withdrawn without the consent of the District for a period of sixty (60) days after the scheduled time of receiving bids.

The Rock River Water Reclamation District, reserves the right to reject any or all bids, or any part thereof, or to accept any bid or any part thereof, or to waive any formalities in any bids, deemed to be in the best interest of the Rock River Water Reclamation District.

Dated this 28th day of May, 2019.


BY: Chris Black, Business Manager

Not to be used for bidding purposes

Article 2 — Instructions to Bidders

1 General

1.1 Scope and Intent

This section of the contract documents is concerned with furnishing detailed information and requirements for preparing bids to prospective bidders, bidders' responsibility, the preparation and the submission of bids, basis for awarding the contract and other general information concerned with bidding and executing the contract.

1.2 Contradictions

If in the case of apparent contradiction between or among the Contract Documents, the Contract Documents shall be consulted in the following order: Addenda, Agreement, Supplementary Drawings, Instructions to Bidders, Detailed Specifications, Plans, District General Provisions and Technical Specifications for Sanitary Sewer Construction. The language in the first such document in which language regarding the conflict, error or discrepancy occurs shall control.

1.3 Pre-Bid Meeting

A MANDATORY pre-bid conference will be held at **10:00 am on Tuesday, June 4, 2019** to address questions from the prospective bidders and to make a tour of the site. Bidders are responsible for legibly signing the attendance list and for making sure their names appear on the attendance list. Bids from Bidders not included on the attendance list will not be opened. The pre-bid conference will be held at the District's Administration Building located at 3501 Kishwaukee Street, Rockford, Illinois 61109.

2 Legal Requirements

2.1 Illinois Regulations

1. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor.

The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on standard IDOT forms.

2. Public Act 83-1030 entitled "Steel Products Procurement Act" requires that steel products used or supplied in performance of this contract or subcontract shall be manufactured or produced in the United States with three exceptions.

The provisions of this Section shall not apply:

- a. Where the contract involves an expenditure of less than \$500.
- b. Where the executive head of the public agency certifies in writing that
 - i. the specified products are not manufactured or produced in the United States in sufficient quantities to meet the agency's requirements, or

- ii. obtaining the specified products, manufactured or produced in the United States would increase the cost of the contract by more than 10%.
 - c. When its application is not in the public interest.
 3. Public Act 96-929 (30 ILCS 570) provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State of Illinois as defined in the Act; and, further, that Illinois workers are available and capable of performing the particular type work involved.
 4. Public Act 99-0933 requires that any party to a contract adopt and promulgate written sexual harassment policies that include, as a minimum, the following information:
 - a. the illegality of sexual harassment
 - b. the definition of sexual harassment under Illinois State law
 - c. a description of sexual harassment, utilizing examples
 - d. my (our) organization's internal complaint process including penalties
 - e. the legal recourse, investigative and complaint process available through the Illinois Department of Human Rights and the Illinois Human Rights Commission
 - f. directions on how to contact the Department and the Commission
 - g. protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act

Upon request, this information shall be provided to the Illinois Department of Human Rights and the District.

5. With regard to nondiscrimination in employment, the Contractor for this project will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations.
6. The Contractor for this project shall comply with the Occupational Safety and Health Act.
7. The Contractor for this project shall comply with the Federal Drug-Free Workplace Act.
8. Public Act 96-1416 requires the Certification of Clean Construction and Demolition Debris (CCDD) and uncontaminated soil prior to disposal at a CCDD fill site. The Contractor for this project shall comply with Public Act 96-1416 and be responsible for the certifications and any fees associated with the disposal at a CCDD fill site.
 - a. In the event that contaminated soil is uncovered on the project, the Contractor shall notify the District immediately. Any extra costs resulting from the presence of contaminated soil shall be evaluated in accordance with District General Provisions & Technical Specs for Sanitary Sewer Construction; General Conditions: Article 5 – Time Provisions and Article 8 – Changes.

2.2 Americans with Disabilities Act

The Contractor for this project will comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify Rock River Water Reclamation District (District) and their representatives from all:

1. suits, claims, or actions
2. costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement

3. damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

3 General Instructions

3.1 Bidder's Responsibility

Bidders are cautioned not to submit proposals until having carefully examined the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and having made all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing and handling the materials at the site, and having informed themselves thoroughly as to all difficulties involved in the completion of all the work under this Contract in accordance with its requirements.

Bidders must examine the Plans, Specifications and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amount or quantities necessary to complete fully the work in strict compliance with the Contract Documents. The Bidder must satisfy himself by making borings or test pits, or by such methods as he may prefer, as to the character and location of the materials to be encountered or work to be performed. No pleas of ignorance of conditions that exist or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work under this Contract, as a result of failure to make the necessary examinations and investigations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill, in every detail, all of the requirements of the Contract Documents, or will be accepted as a basis for any claims whatsoever for extra compensation or for an extension of time.

The Contractor is responsible for verifying the location of all existing utilities in the project areas.

The Bidder, therefore, shall satisfy himself by such means as he may deem proper as to the location of all structures that may be encountered in construction of the work.

3.2 Addenda and Interpretations

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any bidder orally. Every request for such interpretation must be in writing addressed to the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois. To be given consideration, such request must be received at least five (5) days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by email, fax, or certified mail with acknowledgement of receipt requested, to all prospective bidders, at the respective addresses furnished for such purposes, not later than three (3) days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addenda or interpretation shall not relieve said bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

3.3 Laws and Regulations

The prospective bidder is warned that he must comply with all laws of the United States Government, State of Illinois, all ordinances and regulations of the District in the performance of the

work under this contract. The Bidder's attention is specifically called to that provision of the General Conditions regarding the rate of wage to be paid on the work.

3.4 Quantities Estimated Only

Bidders are warned that the estimate of quantities of the various items of work and materials, as set forth in the proposal form, is approximate only and is given solely to be used as a uniform basis for the comparison of bids. The quantities actually required to complete the contract work may be less or more than so estimated, and if awarded a contract for the work specified, the Contractor further agrees that he will not make any claim for damages or for loss of profits or for an extension of time because of a difference between the quantities of the various classes of work assumed for comparison of bids and quantities of work actually performed.

3.5 Form, Preparation, and Presentation of Proposals

For particulars as to the quantity and quality of the supplies, materials and equipment to be furnished, and the nature and extent of the work or labor to be done, prospective bidders are referred to the Contract Documents, which may be examined or obtained at the office of the District.

Each bid will be submitted upon the prescribed proposal form. All blank spaces for bid prices must be filled in, in ink, with the unit or total sum or both for which the proposal is made. If the proposal contains any omissions, erasures, alterations, additions or items not called for in the itemized proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of bid. In case of any discrepancy in the unit price or amount bid for any item in the proposal, the unit price as expressed in figures will govern. In no case is the agreement form to be filled out or signed by the bidder.

The Contractor may opt to contact the District's Engineering Department at 815.387.7660 to obtain an electronic Proposal form. If used, this form must be attached to the hard copy proposal form and appropriately signed and executed with the bid.

The bid must be verified and be presented on the prescribed form in a sealed envelope on or before the time and at the place stated in the Advertisement for Bids, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the bid is made. If forwarded by mail, the sealed envelope containing the proposal and marked as directed above, must be enclosed in another envelope addressed to Clerk of the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois, 61109 and be sent preferably by certified mail. The District will not accept facsimile generated bids.

3.6 Bid Security

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount specified in Article One, Notice to Bidders. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured. The District's Bid Bond Form included in the bid packet must be used. No other Bid Bond form may be substituted.

Within ten (10) days after the opening of bids, the deposits of all but the three lowest bidders will be returned. The deposits of the remaining two unsuccessful bidders will be returned within three (3) days after the execution of the contract, or, if no such contract has been executed, within sixty (60) days after the date of opening bids. The deposit of the successful bidder will be returned only after he has duly executed the contract and furnished the required bond and insurance.

3.7 Affidavit of Compliance

Each proposal must be accompanied by an executed Affidavit of Compliance. A separate Affidavit of Compliance form is enclosed with the Proposal packet. Failure to submit an executed Affidavit of Compliance with the proposal may constitute sufficient cause for rejection of the bid.

3.8 Statement of Qualifications

Each proposal must be accompanied by a Statement of Qualifications certifying that the bidder is registered to do business in the State of Illinois, has a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL, and provides documentation that the bidder possesses the appropriate financial, material, equipment, facility and personnel resources and expertise necessary to meet all contractual obligations. The bidder shall document no less than three (3) contracts for sanitary sewer system within the past five (5) years having equal or greater value to the bid being submitted. The District reserves the right to request additional information as needed to evaluate bids prior to making an award.

3.9 Comparison of Proposals

Bids on item contracts will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantities of each item, multiplied by the corresponding unit prices and including any lump sum bids on individual items, in accordance with the estimate of quantities set forth in the proposal form. Bids on lump sum contracts will be considered upon the basis of the lowest sum bid.

3.10 Acceptance of Bids and Basis of Award

No bidder may withdraw his bid after the scheduled closing time for receipt of bids, for at least sixty (60) days.

The contract will be awarded, if at all, to the lowest responsive, responsible bidder. The Rock River Water Reclamation District also reserves the right to reject any or all bids.

The bidder whose proposal is accepted shall enter into a written contract for the performance of the work and furnish the required bonds and insurance certificate within ten (10) days after written notice by the Engineering Manager of the District has been served on such bidder personally or by mailing a postpaid wrapper to such bidder at the address given in his proposal. If the bidder to whom the contract is awarded refuses or neglects to execute it or fails to furnish the required bond and insurance within five (5) days after receipt by him of the notice, the amount of his deposit shall be forfeited and shall be retained by the District as liquidated damage and not as a penalty. It being now agreed that said sum is a fair estimate of the amount of damages that the District will sustain in case said bidder fails to enter into a contract and furnish the required bond and insurance. No plea of mistake in the bid shall be available to the bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

3.10.1 Evaluation of Responsiveness

The responsiveness of bidders will be judged on the basis of the completeness of the bid submitted. To be responsive, a Bid must be submitted on the forms provided as part of the Bid Documents and comply with all the requirements of the Instruction to Bidders. Within two (2) business days of the bid opening, the apparent successful bidder must provide an approved Schedule of Values.**3.10.2**

Evaluation of Responsibility

To be judged as responsible, the bidder shall:

- a. Have adequate financial resources for performance, the necessary experience, organization, technical qualifications, and facilities, or a firm commitment to obtain such by subcontracts;
- b. Be able to comply with the required completion schedule for the project;
- c. Have a satisfactory record of integrity, judgment, and performance, including, in particular, any prior performance on contracts from the District;
- d. Have an adequate financial management system and audit procedures, that provide efficient and effective accountability and control of all property, funds, and assets;
- e. Conform to the civil rights, equal employment opportunity and labor law requirements of the Bid Documents.
- f. Have satisfactorily completed no less than three (3) sanitary sewer system contracts within the past five (5) years of equal or greater value to the bid being submitted.

3.11 The Rejection of Bids

The District reserves the right to reject any bid if the evidence submitted in the statement of the bidder's qualifications, or if investigation of such bidder fails to satisfy the District that such bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all proposals will be rejected if there is reason to believe that collusion exists among the bidders. Conditional bids will not be accepted. The District reserves the right to reject any and all bids and to accept the bid which they deem most favorable to the interest of the District after all proposals have been examined and canvassed.

3.12 Insurance and Bonding

Contractor shall provide all necessary insurance and bonds required to complete the project. No more than ten (10) calendar days subsequent to the District's issuance of an award letter, the Contractor shall provide documentation to prove that he has obtained all required insurance and bonds. The District shall be the sole judge as to the acceptability of any such proof.

Contractor shall provide and maintain all insurance and bonds as required by the District.

3.12.1 General

The Contractor shall ensure that:

1. All insurance policies shall be specific to the project.
2. The insurance certificate shall state: This certifies that the insurance coverage meets or exceeds that required for Substation 3-6 Electrical Upgrades, Capital Project No. 2023.
3. The District shall be named as Additional Insured in all policies; this shall include the Owners Contractors Protective Policy option.
4. All completed operations coverages and bonds shall remain in force for a period of two (2) years following acceptance of the project and completed operations shall stay in force for two (2) years following completion of the project.

3.12.2 Insurance

The Contractor shall, for the duration of the contract and for two (2) years following project acceptance, maintain the following:

1. **General Liability**: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a

general aggregate limit is used, either the general aggregate limit shall apply separately to this project or the general aggregate limit shall be twice the required occurrence limit. The Contractor shall provide "XCU" coverage.

2. Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage including coverages for owned, hired or non—owned vehicles, as applicable.
3. Workers' Compensation and Employers Liability: Workers' Compensation limits as required by statute and Employers Liability limits of \$500,000 per accident and \$500,000 per disease.
4. Umbrella: \$2,000,000 per occurrence/aggregate for contracts valued at \$500,000 or over, or \$1,000,000 for contracts below \$500,000. \$10,000 is maximum allowable self-retained limit.
5. Errors and Omissions: If the Contractor performs professional services, he shall maintain errors and omissions insurance with a limit no lower than \$1,000,000 for the duration of the contract.

The policies shall contain, or be endorsed to contain, the following provisions in the General Liability and Automobile Liability Coverage's:

- a. Unless otherwise provided in paragraph "c" of this section, the District, its officers, officials, employees and volunteers shall be covered as additional insureds as respects liability arising out of activities performed by or on insured's general supervision of the Contractor, products and completed operations of the Contractor, premises owned, occupied or used by the Contractor, or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the District, its officers, officials, employees, volunteers, or agents.
- b. Unless otherwise provided in paragraph "c" of this section, the Contractor's insurance coverage shall be primary insurance as respects the District, its officers, officials, employees, volunteers, and agents. Any insurance or self-insurance maintained by the District, its officers, officials, employees, volunteers, or agents shall be excess of the Contractor's insurance and shall not contribute with it.
- c. As an acceptable alternative to provisions "a" and "b" of this section, the Contractor may provide owner's and contractor's protective liability insurance with coverage limits, named insureds, and in conformity with all applicable specifications of this section.
- d. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the District, its officers, officials, employees, volunteers, or agents.
- e. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
- f. All Coverages — Each insurance policy required by this clause shall not be suspended, voided, canceled by either party, reduced in coverage, or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the District.

3.12.3 Best's Ratings

The District shall be the sole judge of whether or not said insurer's ratios are satisfactory. The District's decision shall be final and the District's bidding procedures contain no appeal provision.

1. Alphabetical Rating: For purposes of this Request for Bids, "insurer" shall mean any surety, insurance carrier, or other organization which proposes to provide an insurance policy or bond for the Contractor. No insurer or surety rated lower than "A-, Excellent" in the current *Best's Key Rating Guide* shall be acceptable to the District.
2. Financial Size Rating: Provided an insurer's alphabetical rating is satisfactory, the District will examine said insurer's financial size rating.
 - a. If Best classifies the insurer XII or larger, said insurer shall be acceptable to the District.
 - b. If Best classifies the insurer as smaller than XII, but larger than VI, said insurer shall be submitted to the District's Business Manager and/or the District's insurance consultant for review.

Financial Size ratings less than VII are not acceptable and will disqualify the Contractor.

3.12.4 Performance Bond and Labor & Materials Payment Bond Form

The Contractor shall provide a Performance Bond and Labor & Materials Payment Bond form acceptable to the District. The performance bond shall be for either 100% of the contract price or for the Contractor's unit price times the estimated number of units, as applicable.

This Request for Bids contains a Performance Bond and a Labor & Material Bond form for the Contractor's use.

If the Contractor fails to provide acceptable bonds within the specified time, he shall be in default.

3.12.5 Correction of Contractor's Insurance or Bond Deficiencies

If the District determines that the Contractor's insurance or bond documentation does not conform to these specifications, the District shall inform said Contractor of the non-conformity. If said Contractor fails to provide conforming insurance or bond documentation within five (5) calendar days of the District's deficiency notice, he shall be in default.

3.12.6 Indemnification Clause

Contractor shall protect, indemnify, hold and save harmless and defend the District, its officers, officials, employees, volunteers, and agents against any and all claims, costs, causes, actions and expenses, including but not limited to attorney's fees incurred by reason of a lawsuit or claim for compensation arising in favor of any person, including the employees, officers, independent contractors, or subcontractors of the Contractor or District, on account of personal injuries or death, or damages to property occurring, growing out of, incident to, or resulting directly or indirectly from the performance by the Contractor or subcontractor, whether such loss, damage, injury or liability is contributed to by the negligence of the District or by premises themselves or any equipment thereon whether latent or patent, or from other causes whatsoever, except that the successful bidder shall have no liability for damages or the costs incident thereto caused by the sole negligence of the District.

The indemnification shall not be limited by a limitation on amount or type of damages payable by or for the Contractor or its subcontractor under any employee benefits act including, but not limited, to the Workers Compensation Act.

No inspection by the District, its employees, or agents shall be deemed a waiver by the District of full compliance with the requirements of the Contract. This indemnification shall not be limited by the required minimum insurance coverages in the Contract.

3.13 Tax Exemption

The District is exempt, by law, from paying bidder Federal Excise Tax and Illinois Retailers' Occupational Tax. Therefore, the bidder shall exclude those taxes from his bid. The District's tax exemption number is E9992-3696-06. The bidder shall include all applicable taxes in his bid price.

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ARTICLE 3 — TECHNICAL SPECIFICATIONS

Rock River Water Reclamation District

Substation 3-6 Electrical Upgrades Capital Project No. 2023

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Not to be used for bidding purposes

SECTION 01 00 00 – PROJECT REQUIREMENTS

1.1 GENERAL DESCRIPTION OF WORK

The Work to be performed under these Contract Documents is generally described as follows:

This project consists of furnishing and installing new 3200A/480V Main-Tie-Main Switchgear 3-6, a new 2500kVA transformer T-3, an existing refurbished 2500kVA transformer T-6 provided by the owner, new medium voltage primary feeders to T-3 and T-6, new low voltage secondary feeders to the Admin-2, Admin-3, and Aqua Nereda MCC, a new Automatic Transfer Switch at the Aqua Nereda facility, a new Main Distribution Panel at Admin-2, and the associated ductbank to support current loads and future expansion as shown on the project drawings. The existing 1600A Power Center 2 will be removed and the existing transformers T-3 and T-6 will be delivered to the Owner.

Testing and commissioning of all gear will be completed prior to connecting live loads.

2.0 UNITS OF MEASUREMENT

Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

3.0 WORK BY OWNER

Owner shall perform certain activities in connection with the Project with its own personnel as follows:

The Owner will operate the existing plant during construction.

4.0 OFFSITE STORAGE

Offsite storage arrangements shall be approved by Owner for all materials and equipment. Such offsite storage arrangements shall be presented in writing, and shall afford adequate and satisfactory security and environmental protection. Offsite storage facilities shall be accessible to Owner and Engineer. Applications for Payment for equipment stored off-site shall not be accepted; materials and equipment shall be paid in full and stored on site prior to requesting reimbursement.

5. ITEMS FURNISHED BY OWNER

5.01 Items to be re-used. The contractor will be permitted to inspect the refurbished transformer T-6 in order to obtain detailed measurements for conduit rough-ins. Contractor shall provide Owner an opportunity to inspect items intended to be removed and re-used as part of the Work. Owner shall have the right to provide substitute materials if salvage items are not desired for re-use as indicated in the Contract Documents.

6.0 SUBSTITUTES AND "OR-EQUAL" ITEMS

Provisions for evaluation of substitutes and "or-equal" items of materials and equipment are covered in Paragraph 6.05 of the General Conditions. Requests for review of equivalency will not be accepted by Engineer from anyone except Contractor, and such requests will not be considered until after the Effective Date of the Agreement.

7.0 PREPARATION FOR SHIPMENT

All materials shall be suitably packaged to facilitate handling, and protected against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

8.0 LAND FOR CONSTRUCTION PURPOSES

Contractor will be permitted to use available land belonging to Owner, on or near the Site, for construction purposes and for storage of materials and equipment as indicated on project drawings.

Contractor shall immediately move stored materials or equipment if any occasion arises, as determined by Owner, requiring access to the storage area. Materials or equipment shall not be placed on the property of Owner until Owner has agreed to the precise location to be used for storage.

9.0 EQUIPMENT

The Contractor shall not be permitted to use existing, District-owned equipment.

The Contractor shall provide all materials and equipment in suitable and adequate quantities as required to accomplish the work shown, specified herein, and as required to complete the project. Devices, ladders, and other tools or equipment belonging to the District shall not be used to accomplish this work.

If District's tools or equipment obstruct the work, Contractor shall notify the District's Representative and request that the District temporarily relocate such items until such time as work has been accomplished. If District's tools or equipment are missing or damaged during the duration of the work, Contractor shall be responsible for replacement or repair to a condition that existed prior to the commencement of the work.

All tools, materials and equipment shall be clearly labeled with names of Contract and Contractor. Containers of materials and equipment shall also include labeling indicating contents.

10. OPERATION OF EXISTING FACILITIES

The existing facilities must be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service currently provided. Contractor shall provide Temporary Facilities per Section 01 15 00 and make temporary modifications as necessary to keep the existing facilities in operation during the construction period. Due to potential health hazards and requirements of State of Illinois Environmental Protection Agency and U.S. EPA, existing wastewater treatment facilities must be maintained in operation during construction. Degree of treatment during construction shall be equal to or exceed efficiency of facility before construction started.

Operations shall be done in such manner as to avoid hazards to persons and property and interference with the use of adjacent areas or interruption of free passage to and from such areas. Care shall also be taken to prevent the spread of dust and flying particles.

Owner access to the Grit Building and Aqua Nereda Facility must be maintained at all times.

Guidelines for key portions of the facility are provided herein. The allowable length of time for all other planned outages shall be closely coordinated with RRWRD Operations and shall not exceed 60 minutes.

10.01. Active Connections. As shown on the Drawings, several existing and active connections will be traversed as part of the Work. When required and with Owner permission, these may be taken out of service for short periods of time. The allowable length of time for each service outage shall be coordinated with the Owner, but shall not exceed 4 hours.

Unless otherwise noted, the Contractor shall assume that all process piping and electrical wiring is in service.

Where interference with facilities occurs, cooperate with District to eliminate interference. Operation of breakers or other disconnecting means on the existing electrical equipment, when required, shall be by or under the direct supervision of the Owner.

Take whatever precautions are necessary to prevent any damage to existing buildings and structures which are to remain, and promptly repair any such damage that occurs as a result of construction.

Cease operations and notify the District's Representative immediately if adjacent appurtenances appear to be endangered in any way. Do not resume operations until corrective measures have been taken.

11.0 LINES AND GRADES

The drawings show approximate alignment for the new ductbank between the new Switchgear 3-6 and Buildings. RRWRD may provide more precise horizontal alignment for the new ductbank. The contractor shall be responsible for all vertical control. Any survey, layout, and measurement work shall be performed by Contractor as a part of the Work.

Contractor shall provide a licensed Illinois Professional Land Surveyor, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, Contractor shall furnish, without charge, competent persons and such tools, stakes, and other materials as Engineer may require in establishing or designating control points or in checking survey, layout, and measurement work performed by Contractor.

Contractor shall keep Engineer informed, a reasonable time in advance, of the times and places at which it wishes to do Work.

Contractor shall remove and reconstruct work which is improperly located.

12.0 CONNECTIONS TO EXISTING FACILITIES

Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum

time. Operation of electrical devices, valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

13.0 UNFAVORABLE CONSTRUCTION CONDITIONS

During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

14.0 CUTTING AND PATCHING

As provided in General Conditions, Contractor shall perform all cutting and patching required for the Work and as may be necessary in connection with exposing Work for inspection, or for the correction of defective Work.

Contractor shall perform all cutting and patching required for and in connection with the Work, including but not limited to the following:

Removal of improperly timed Work.

Removal of samples of installed materials for testing.

Alteration of existing facilities.

Installation of new Work in existing facilities.

Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations. Contractor shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without Engineer's concurrence.

Materials shall be cut and removed to the extent indicated on the Drawings or as required to complete the Work. Materials shall be removed in a careful manner, with no damage to adjacent facilities or materials. Materials which are not salvable shall be removed from the site by Contractor.

All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Engineer, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

Where new Work is to be installed or suspended concealing existing surfaces or spaces, Contractor shall remove foreign substances such as grease, sludge, and odoriferous materials before starting Work.

Where surfaces are to remain exposed, Contractor shall remove foreign substances such as grease, sludge, and odoriferous material.

15.0 HAZARDOUS ENVIRONMENTAL CONDITIONS AT SITE

No Hazardous Environmental Conditions at the Site in areas that will be affected by the Work are known to the Owner.

15.01 Previously Unidentified Hazardous Environmental Conditions. If, during the progress of the Work, previously unidentified Hazardous Environmental Conditions are identified, Contractor shall stop work in the affected area and immediately notify the Owner and Engineer in accordance with the requirements in the General Conditions. At the Owner's discretion, the Owner may instruct the Contractor to engage an abatement Subcontractor qualified to perform abatement of the suspected Hazardous Environmental Condition identified, to verify the materials and, if necessary, encapsulate, enclose, or remove and dispose of all ACM, Metal Bearing Protective Coatings, Paints, and Linings, Contaminated Environmental Media, and/or other Hazardous Substances in accordance with current regulations of the Environmental Protection Agency and the U. S. Department of Labor - Occupational Safety and Health Administration, the applicable state regulating agency, and any local government agency. Payment for such work will be made by Change Order.

16. CLEANING UP

Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish, as well as spillage from connections to existing piping. Contractor shall provide adequate trash receptacles about the Site and shall promptly empty the containers when filled.

Perform daily cleaning and final cleaning to District's satisfaction.

1. Clean District-occupied areas daily. Debris shall not be allowed to accumulate. Excess debris and waste material shall be removed from the site daily as the work progresses.
2. Clean spillage, overspray, and heavy collection of dust in District-occupied areas immediately. At completion of alteration and work in area, provide final cleaning and return space to condition suitable for use by District.

Where existing materials, equipment and debris are to be removed, Contractor shall be responsible for removal and disposal. Disposal shall be in accordance with all applicable codes and regulations. Remove materials from the site as work progresses. Leave areas in clean condition upon completion of the work. Remove all temporary work.

Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.

Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the Site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the Site and disposed of in a manner complying with local ordinances and antipollution laws.

Adequate cleanup will be a condition for recommendation of progress payment applications.

17. APPLICABLE CODES

References in the Contract Documents to local codes mean the following:

- ICC International Building Code (with local amendments), 2015 edition
- ICC International Existing Building Code (with local amendments), 2015 edition
- ICC International Fire Code (with local amendments), 2015 edition
- ICC International Mechanical Code (with local amendments), 2015 edition
- ICC International Fuel Gas Code (with local amendments), 2015 edition
- IDPH Illinois Plumbing Code (with local amendments), 2014 edition
- NFPA 70 National Electric Code (with local amendments), 2014 edition
- NFPA 780 Standard for Installation of Lightning Protection Systems, 2017 Edition
- NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities, 2008 edition
- ICC International Energy Conservation Code as adopted by the Illinois Energy Efficient Building Act (with state and local amendments) 2015 edition
- IEPA: Part 370, Illinois Recommended Standards for Sewage Works, November 1997 edition
- ASTM Material Standards
- RRWRD General Provisions & Technical Specifications for Sewer Construction, dated 1983
- Other standard codes which apply to the Work are designated in the Specifications.

18. PRECONSTRUCTION CONFERENCE

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:

Contractor and its superintendent.

Principal Subcontractors.

Representatives of principal Suppliers and manufacturers as appropriate.

Engineer and its Resident Project Representative.

Representatives of Owner.

Government representatives as appropriate.

Others as requested by Contractor, Owner, or Engineer.

Unless previously submitted to Engineer, Contractor shall bring to the conference a preliminary schedule for each of the following:

Progress Schedule.

Procurement Schedule.

Schedule of Values for progress payment purposes.

Schedule of Shop Drawings and other submittals.

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 agenda will include:

- Contractor's preliminary schedules.
- Transmittal, review, and distribution of Contractor's submittals.
- Processing Applications for Payment.
- Maintaining record documents.
- Critical Work sequencing.
- Field decisions and Change Orders.
- Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
- Major equipment deliveries and priorities.
- Contractor's assignments for safety and first aid.

The owner will preside at the conference and the prime contractor will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

19. PROGRESS MEETINGS

Contractor shall schedule and hold regular progress meetings at least every other week and at other times as requested by Owner, Engineer or as required by progress of the Work. Contractor, Engineer, and all Subcontractors active on the Site shall be represented at each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

Contractor shall preside at the meetings. Meeting minutes shall be prepared and distributed by Contractor. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

20. SITE ADMINISTRATION

Contractor shall be responsible for all areas of the Site used by it and by all Subcontractors in the performance of the Work. Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others. Contractor shall have the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all persons on the Site (except Owner's employees) to observe the same regulations as Contractor requires of its employees.

Confine all work operations and activities to the immediate and general vicinities as may be necessary to complete the specified work.

Contractor shall coordinate construction operations with the District.

Assume full responsibility for protection and safekeeping of material and products stored on or off premises.

Move any stored material or products which interfere with operations of District or other Contractors

The Contractor shall be allowed reasonable use of available on-site 120-V electrical power sources for hand held tools, ancillary lighting, etc., as long as it does not interfere with the normal functioning of District operations and as long as the usage does not develop into an abuse. Any power needs greater than 120-V shall be the Contractor's responsibility.

21.0 SCHEDULE AND SEQUENCE OF OPERATIONS

21.1 Progress of the Work_The work shall be performed at such times and in or on such parts of the project and with such forces, materials and equipment to prevent any delay to the completion of the project within the time limits stated in the, and in accordance with the sequences and constraints specified herein.

21.2 Work Hours

The Contractor may, with written approval from the District and acquisition of all necessary permits, and at the Contractor's own expense carry on work outside regular hours of 7:00 a.m. to 5:00 p.m., Monday through Friday excluding holidays for work inside the District's (District's) Plant grounds. To obtain District consideration of work outside the above-mentioned hours, or on Saturdays, Sundays or holidays, the contractor shall submit a written request, with reasons, to the Engineer and shall allow 48 hours for written approval and satisfactory arrangements to be made for observing the work in progress. The Contractor shall comply with all applicable requirements of the District. For work within District Wastewater Treatment Plant grounds, all issues relating to timing and access must be cleared with the District and the District's inspector and coordinated with the Guard in shack at Plant Grounds entrance. Equipment at the Aqua Nereda Facility operates 24 hours per day, and power cannot be shut down or interrupted without prior arrangements.

Such permission, however, shall be subject to revocation if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work.

21.2 Sequences and Constraints

The Contractor shall plan, schedule and coordinate his work to minimize the amount of time existing facilities are out of service due to construction. All scheduled outages shall be no greater than 60 minutes. During the entire period of the contract, provide restoration of any unscheduled power interruption within 30 minutes during regular business hours, and within 2 hours at night and on weekends. Coordination with District operating staff shall be done through the Engineer and the District's On-site Representative. The Contractor shall be responsible for scheduling his work per the sequences and constraints specified herein.

The Contractor shall perform all work in a manner so as not to interfere with other utility lines (water, sanitary, gas etc.) in the vicinity. All construction activities shall be coordinated and scheduled with the District so as to minimize conflicts with ongoing operations and other construction work.

Required removals and relocations of existing piping, wiring and related appurtenances shall be coordinated with the District.

Contractor shall be responsible for all temporary electrical, piping and any other facilities required to minimize the amount of time the various operations are out of service. Downtime of certain operations and/or processes may be allowed with District's approval.

Before any shutdown coordination takes place, verify that all equipment, materials, and other necessary items required for shutdown work are on-site and prepared for installation. Pre-fabricate as much of this work as possible for accurate and proper installation.

Any modifications to existing equipment, piping, electrical, etc. required to remove and/or install new equipment shall be approved by the Engineer and performed at the sole expense of the Contractor.

The following sequences and constraints are essential to reducing downtime of facilities due to construction and the time of completion of this project.

Unless otherwise specified, the Contractor shall provide RRWRD Staff with 48 hours advanced notice to request a shutdown or outage of any existing facility needed to complete the work. The Contractor shall provide evidence that all necessary equipment items are on hand or on site at the time of the request. All system shutdowns or outages must be approved by the Rock River Water Reclamation District. District reserves right to place facilities taken out of service back into service on emergency basis upon notification to Contractor. It shall be the Contractor's responsibility to clean the facilities to enable construction and to transport any waste materials removed to an appropriate on-site location (Plant grounds) directed by the Engineer. The Contractor shall be fully responsible for providing all temporary piping, electrical work, heating, ventilating, air conditioning, lighting, temporary structures, and related work to minimize the time operations are out of service. Not all details of construction are necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility of avoiding interruptions to processes that are essential to the safe and normal functioning of various plant operations. All utilities shall be located and marked prior to construction.

21.3 Overall Construction Schedule

The Overall Schedule shall begin with the date the District issues the Notice to Proceed and conclude with the date of Final Completion of the Contract. Failure to submit a project schedule will be considered cause for withholding of any partial payments otherwise due under the Contract in accordance with the General Conditions.

Contractor shall provide a detailed written construction sequencing plan prior to the start of work. The sequencing plan included with the project drawings provides a minimum scope for bidding purposes. The detailed plan shall include a schedule of all work with special attention given to the transitions to/from temporary power.

21.4 Delays and Recovery

If it becomes evident the work will not be completed by the contract completion date, the Contractor shall submit a revised schedule outlining the additional amount of time needed to expedite completion of the remaining work. Contractor shall be liable for liquidated damages for all unjustifiable delays per the terms of the contract.

Once the Contractor starts on any part of the work which could potentially impact the safe and normal operation of various District (Plant) facilities, he shall diligently and expeditiously prosecute such work until such time that the potential for deleterious impact is avoided.

Whenever it becomes apparent from the current progress of construction that the interface completion dates and/or contract completion dates will not be met, the Contractor shall take some or all of the following actions:

1. Increase construction manpower in such quantities and crafts as shall substantially eliminate the backlog of work.
2. Increase the number of working hours per shift, shifts per work day, work days per week, or the amount of construction equipment, or any combination of the foregoing sufficient to substantially eliminate the backlog of work.
3. Reschedule work items to achieve concurrency of accomplishment.

The addition of equipment or construction forces, increasing the working hours or any other method, manner or procedure needed to make up for time lost due to avoidable delays shall not be considered justification for a Change Order or regarded as an acceleration order.

22.0 SITE PREPARATION

22.1 Preconstruction Videotaping. The District may conduct videotaping of the site and all existing appurtenances prior to construction. Videotaping is intended for use as evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations and is for the protection of the Contractor and the District. Videotaping will provide a means of determining whether and to what extent damage may have occurred as a result of the Contractor's operations.

22.2 Responsibility. The Contractor shall be responsible for determination of the full extent and nature of the work involved in disconnection and removing existing materials and equipment by careful review of the Plans and Specifications and by conducting a thorough inspection of the project site and surrounding areas prior to submitting a bid. The Contractor shall contact the District's Representative to arrange a site visit during normal working hours. Failure to do this shall not relieve the Contractor of responsibility to complete this work for the bid price submitted. Conduct site preparation work to minimize interference with other work being performed in vicinity.

22.3 Existing Conditions

Some existing conditions may not be shown. Bidders are advised to carefully inspect the existing sites before preparing their proposals. The removal of minor obstructions encountered that are not shown on the drawings, but could have been foreseen by visual inspection of the site prior to bidding, shall be anticipated and accomplished without a cost adjustment to the contract, even though not shown or specifically mentioned.

Major obstructions encountered that are not shown on the drawings, or could have been foreseen by visual inspection of the site prior to bidding, should immediately be brought to the attention of the District's Representative. The District's Representative will make a determination before proceeding with the Work. If the District's Representative finds that the obstruction adversely affects the Contractor's cost or schedule for completion, an appropriate adjustment to the contract will be made.

The approximate location of the existing items to be moved or removed is shown on the drawings. All site preparation work shall be coordinated between the specifications and all drawings. Site preparation requirements identified on the drawings shall not be limited to those explicitly identified on drawings.

22.4 Repair Of Damage. Material for repair of facilities damaged and disturbed during site preparation work shall be equal to that existing prior to the start of the work. See also Section 025000.

22.5 Site Work

Perform work so as not to interfere with the work of other contracts in vicinity.

Work equipment shall be selected and operated such that structures, utilities, and other existing works that are to remain will not be damaged and cause injury to workers.

Provide temporary shoring, bracing, and other means to ensure safety of workers during demolition and removal.

23.0 PROTECTION OF PROPERTY

Provide, erect and maintain temporary barriers and barricades, as required, around the demolition work area to prevent the personnel from entering the work vicinity.

The Contractor shall protect the existing buildings, structures and property, in the vicinity of the work from damage. The Contractor shall provide bracing and shoring as necessary. The Contractor shall also protect other miscellaneous items, such as manholes and piping, which are not a part of the proposed work.

The Contractor shall protect existing property, roads, walks, equipment, or vehicles, and other potentially impacted items, which are not a part of the proposed work, which may be in the vicinity of the proposed work.

Perform work with trades qualified to perform work in manner causing least damage to each type of work.

Dust, dirt, and debris shall be controlled to protect existing equipment and operations from shutdown.

Contractor shall provide watertight and dust-tight enclosures for existing equipment that may be affected by operation of concrete saws, drills, or other work activities. Contractor shall ensure that protective enclosures do not shut down equipment due to excessive heat accumulation.

Give special attention to fire protection in areas where welding will be performed. Flame cutting shall not be permitted without special approval by the District's Representative. Protect combustible materials. Provide dry chemical extinguisher and train workers in their use.

Maintain in service and protect from damage and leakage, all existing utilities that are not being removed or replaced.

END OF SECTION 01 00 00

Not to be used for bidding purposes

SECTION 01 15 00 – TEMPORARY FACILITIES

1. OFFICE AT SITE OF WORK. During the performance of this Contract, Contractor shall maintain a suitable office at or near the Site which shall be the headquarters of its representative authorized to receive drawings, instructions, or other communication or articles. Any communication given to the said representative or delivered at Contractor's office at the Site in the representative's absence shall be deemed to have been delivered to Contractor.

Copies of the Drawings, Specifications, and other Contract Documents shall be kept at Contractor's office at the Site and available for use at all times.

2. WATER. Except as listed herein, all water required for and in connection with the Work to be performed will be furnished by Owner in the vicinity of the Site without charge to Contractor, provided:

- a. Contractor shall procure such water in the location and in the manner designated by Engineer.
- b. Contractor at its own expense shall make authorized connections and provide means for delivering the water to the Site.
- c. Contractor shall provide adequately against waste and needless use of water.

Potable water used for domestic purposes, including drinking and handwashing, shall be supplied by the Contractor.

3. POWER. Contractor shall be responsible for all electrical power usage in the Contractor's office trailer area and staging area along with all of their subcontractors. Contractor may purchase power from the Owner if the Contractor does not want to provide his own power. To purchase power, Contractor shall coordinate with the Owner where to connect to the Owner's Power, provide a meter, and make payments to the Owner. The Owner will charge the Contractor only the Owner's cost for power.

Miscellaneous power will be made available to the Contractor by Owner at no cost to the Contractor, subject to the following conditions:

- a. Existing lighting systems may be utilized by Contractor to the extent available. Any necessary additional or temporary lighting systems shall be provided by Contractor at no additional cost to Owner.
- c. Power will be available at 120 volts, 60 Hz, single phase at convenience receptacles. No 480 volt power will be available.
- d. Electrical power shall be used only in such quantities as will not interfere with Owner's requirements, and care shall be taken not to overload the existing facilities. Contractor shall provide any additional or temporary electrical power or power of other voltages it may require for prosecution of the Work.

These provisions shall not be construed as a guarantee by Owner of the uninterrupted continuation of power, and interruptions beyond the control of Owner shall not be reason for claims for additional costs nor for extensions of time. Contractor shall provide, at no additional cost to Owner, any necessary power required for prosecution of the Work during such interruptions.

4. VOICE AND DATA SERVICES. Contractor shall make all necessary arrangements and pay all installation charges for voice and data lines in its offices at the Site.

5. SANITARY FACILITIES. Contractor shall furnish temporary sanitary facilities at the Site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. Contractor shall furnish at least one toilet facility for each 20 workers at the site. Contractor shall provide at least one handwashing station next to each temporary sanitary facility. Contractor shall enforce the use of such sanitary facilities by all personnel at the Site.

6. MAINTENANCE OF TRAFFIC. Contractor shall conduct its work to interfere as little as possible with public travel or facility traffic, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, Contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

In making open-cut street crossings, Contractor shall not block more than one-half of the street at a time. Whenever possible, Contractor shall widen the shoulder on the opposite side to facilitate traffic flow. Temporary surfacing shall be provided as necessary on shoulders.

Access to the Grit Building shall be maintained at all times

7. BARRICADES AND LIGHTS. All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.

All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside public streets and highways shall cause the minimum obstruction and inconvenience to the traveling public.

All barricades, signs, lights, and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction thereover.

8. FENCES. All existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of the Work across any tract of land, Contractor shall restore all fences to their original or to a better condition and to their original locations.

9. DAMAGE TO EXISTING PROPERTY. Contractor will be held responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, Owner.

Contractor shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.

Contractor shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or workers to or from the Work. Contractor shall make satisfactory and acceptable arrangements with the agency having jurisdiction over the damaged property concerning its repair or replacement.

10. TREE AND PLANT PROTECTION. All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by Contractor; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

Trees considered by Engineer to have any significant effect on construction operations are indicated on the Drawings and those which are to be preserved are so indicated.

Contractor shall take extra measures to protect trees designated to be preserved, such as erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other Work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment against their trunks.

When injuring or removal of trees designated to be preserved cannot be avoided, or when removal and replacement is indicated on the Drawings, each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible.

All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

11. SECURITY. Contractor shall be responsible for protection of the Site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

No Claim shall be made against Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from Contractor's failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by Owner to protect Owner's existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the Site.

12. ACCESS ROADS. Contractor shall establish and maintain temporary access roads to various parts of the Site as required to complete the Project. Such roads shall be available for the use of all others performing work or furnishing services in connection with the Project.

13. PARKING. Contractor shall provide and maintain suitable parking areas for the use of all workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities.

14. NOISE CONTROL. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

During construction activities on or adjacent to occupied buildings, and when appropriate, Contractor shall erect screens or barriers effective in reducing noise in the building and shall conduct its operations to avoid unnecessary noise which might interfere with the activities of building occupants.

15. DUST CONTROL. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

16. TEMPORARY DRAINAGE PROVISIONS. Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property.

Existing drainage channels and conduits shall be cleaned, enlarged, or supplemented as necessary to carry all increased runoff attributable to Contractor's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect Owner's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding.

17. EROSION CONTROL. Contractor shall prevent erosion of soil on the Site and adjacent property resulting from its construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.

Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

18. POLLUTION CONTROL. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes shall be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance shall be permitted to enter sanitary sewers, and reasonable measures shall be taken to prevent such materials from entering any drain or watercourse.

19. CONCRETE WASHOUT. Contractor shall construct and maintain an above ground, temporary concrete washout facility at a location determined by the District. The facility shall comply with the Illinois Urban Manual, Practice Standard, Code 954. The washout facility and concrete waste shall be removed upon completion of the project. The solidified concrete wash shall be considered Clean Construction or Demolition Debris (C.C.D.D.) as per the Illinois Environmental Protection Act (415 ILCS 5) and disposed of in accordance with the Act. This work shall be incidental to all other concrete work.

END OF SECTION 01 15 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 DEFINITIONS

A. Submittal Descriptions

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description numbers and titles as follows:

B. Preconstruction Submittals

Submittals which are required prior to construction which include: Certificates of insurance, Surety bonds, List of proposed Subcontractors, List of proposed products, Construction Progress Schedule, Submittal register, Schedule of prices, Health and safety plan, Work plan, Quality Control(QC) plan, and Environmental protection plan

C. Approving Authority

Owner authorized to approve submittal.

D. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 VARIATIONS

Variations from contract requirements require Owner approval, and will be considered where advantageous to Owner.

E. Considering Variations

Discussion with Owner prior to submission will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the rejection and removal of such work at no additional cost to the Owner.

F. Proposing Variations

When proposing variation, deliver written request to the Owner, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Owner, including written analysis of the proposed variation. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

G. Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

H. Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Owner of submittals with variations.

1.3 SUBMITTAL REGISTER

- I. Prepare and maintain submittal register, upon contract award. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided in Section 26 00 00. This list may not be all inclusive and additional submittals may be required.

Column (a) Activity Number: Activity number from the project schedule.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (g) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (h) Contractor Material: Date that Contractor needs material delivered to Contractor control.

Column (i) Action Code: Date of action used to record Contractor's review when forwarding submittals to QC.

Column (j) List date of submittal transmission.

Column (k) through (m) List Dates related to review actions.

Column (o) List date approval received.

J. Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the register submitted with the QC plan and the project schedule:

K. Copies Delivered to the Owner

Deliver one copy of submittal register updated by Contractor to Owner with each invoice request.

1.4 SCHEDULING

- A. Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.
- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Owner does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."
- c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.
- d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.5 OWNER APPROVING AUTHORITY

- A. When approving authority is Owner, the Owner will:
- a. Note date on which submittal was received.
- b. Review submittals for approval only for conformance with project design concepts and compliance with contract documents. Owner shall be allocated 10 business days from the time of receipt for submittal review. Contractor to submit to owner two paper copies and an electronic copy of all final approved submittals, prior to substantial completion of the work.
- c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.
- B. Upon completion of review of submittals requiring Owner approval, stamp and date approved submittals. All submittals shall be in electronic format.

1.6 DISAPPROVED/REJECTED SUBMITTALS

- A. Contractor shall make corrections required by the Owner. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the Owner. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Owner requiring rejection and removal of such work at the Contractor's expense.
- B. If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.7 APPROVE SUBMITTALS

- A. Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for.
- B. After submittals have been approved or accepted by the Owner, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary. Contractor shall provide Owner with 2 paper copies of all approved shop drawing submittals, prior to Contractor's request for final payment.

1.8 OPERATION & MAINTENANCE (O&M) MANUALS AND AS-BUILT DRAWINGS

A. O & M Manuals

Prior to start-up of equipment, the Contractor and each major Subcontractor, as it applies to his work, shall submit 3 paper copies and an electronic copy of an operation and maintenance manual presenting full details of care, maintenance and operation of mechanical equipment and other operable equipment of every nature. Manuals shall include such things as:

1. Manufacturer's instructions for care
2. Spare parts lists and sources of supply
3. Wiring diagrams
4. Control diagrams, etc
5. Testing results

The O&M manuals shall be compiled into hard covered 3-ring binders and submitted by the Contractor to the Owner for review and approval.

B. As-Built Drawings

Submit detail drawings showing final equipment layout, including assembly and installation details and electrical connection diagrams; piping layout showing the location of all supports and hangers, typical hanger details, reinforcement spacing rigidity classification, and static pressure. Include any information required to demonstrate that the system has been coordinated and functions properly as a unit on the drawings and show equipment relationship to other parts of the work, including clearances required for operation and maintenance. Submit function designation of the equipment and any other requirements specified throughout this Section with the shop drawings. At termination of work, the Contractor and each major Subcontractor, as it applies to his work, shall submit 3 paper copies and an electronic copy of as-built drawings. As-built drawings to clearly show any field made changes to the original design.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 33 00

SECTION 01 42 00 - REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: <http://www.ansi.org/>

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org or customerservice@awspubs.com
Internet: <http://www.aws.org>

ASME INTERNATIONAL (ASME)
Three Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-854-7179 or 800-843-2763
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: <http://www.asme.org>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9585
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <http://www.astm.org>

COPPER DEVELOPMENT ASSOCIATION (CDA)

260 Madison Avenue
New York, NY 10016
Ph: 212-251-7200
Fax: 212-251-7234
E-mail: questions@cda.copper.org
Internet: <http://www.copper.org>

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

1901 North Moore Street
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
E-mail: isea@safetyequipment.org
Internet: <http://www.safetyequipment.org/>

INTERNATIONAL CODE COUNCIL (ICC)

5360 Workman Mill Road
Whittier, CA 90601
Ph: 1-888-422-7233
Fax: 562-908-5524
E-mail: webmaster@iccsafe.org
Internet: www.iccsafe.org

NACE INTERNATIONAL (NACE)

1440 South Creek Drive
Houston, TX 77084-4906
Ph: 281-228-6200
Fax: 281-228-6300
E-mail: firstservice@nace.org
Internet: <http://www.nace.org>

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

1300 North 17th Street, Suite 1752
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-5900
Internet: <http://www.nema.org/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000 or 800-344-3555
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: <http://www.nfpa.org>

NSF INTERNATIONAL (NSF)

789 North Dixboro Road
P.O. Box 130140
Ann Arbor, MI 48113-0140
Ph: 734-769-8010 or 800-NSF-MARK
Fax: 734-769-0109
E-mail: info@nsf.org

Internet: <http://www.nsf.org>

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

400 Commonwealth Drive
Warrendale, PA 15096-0001
Ph: 724-776-4970
Fax: 724-776-0790
E-mail: customerservice@sae.org
Internet: <http://www.sae.org>

UNDERWRITERS LABORATORIES (UL)

2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577
Fax: 360-817-6278
E-mail: CEC.us@us.ul.com
Internet: <http://www.ul.com/>

U.S. ARMY CORPS OF ENGINEERS (USACE)

Order CRD-C DOCUMENTS from:
Headquarters Points of contact
441 G Street NW
Washington, DC 20314-1000
Ph: 202-761-0011
E-mail: hq-publicaffairs@usace.army.mil
Internet: <http://www.wes.army.mil/SL/MTC/handbook.htm>
Order Other Documents from:
USACE Publications Depot
Attn: CEHEC-IM-PD
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: <http://www.usace.army.mil/publications>
or <http://www.hnd.usace.army.mil/techinfo/engpubs.htm>

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-272-0167
for Fax and E-mail see below
Internet: <http://www.epa.gov>
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-688-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: <http://www.ntis.gov>

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION 01 42 00

Not to be used for bidding purposes

Capital Project No.2023 CLEAN CONSTRUCTION AND DEMOLITION DEBRIS FILL
REQUIREMENTS

**SECTION 02 41 00 – CLEAN CONSTRUCTION AND DEMOLITION DEBRIS FILL
REQUIREMENTS**

PART 1 - GENERAL

1.1 **SUMMARY**

A. Section includes:

1. Regulatory requirements.
2. Definition.
3. Use as fill
4. Exceptions.
5. Contractor's responsibilities.
6. Submittals.

1.2 **REGULATORY REQUIREMENTS**

- A. The Illinois Environmental Protection Agency (IEPA) Bureau of Land regulates fill pits remain to protect groundwater and ensure that they remain uncontaminated when filled with soil and construction debris. This action is mandated under Public Act 96-1416.
- B. This specification was developed to guide the Contractor in complying with the requirements of IEPA. The Contractor is fully responsible for adhering to legal and regulatory requirements whether or not they are listed in the specification.

1.3 **DEFINITION**

- A. Clean construction or demolition debris (CCDD) is uncontaminated broken concrete without protruding metal bars, bricks, rock, stone, or reclaimed asphalt pavement generated from construction or demolition activities.
- B. When uncontaminated soil is mixed with any of these materials, the uncontaminated soil is also considered CCDD.
- C. Uncontaminated soil that is not mixed with other CCDD materials is not CCDD.
- D. For the purposes of CCDD classification, industrial/commercial property includes any real property that does not meet definition of residential property, conservation property, or agriculture property and includes public roadway right-of-ways.

1.4 **USE AS FILL**

- A. Filling quarries, mines, and other excavations with CCDD requires a permit from the Illinois EPA's Bureau of Land. Per the IEPA "Other excavations" do not include holes, trenches, or similar earth removal created as part of normal construction, removal, or maintenance of a structure, utility, or transportation infrastructure.

1.5 EXCEPTIONS

- A. In lieu of following the requirements specified herein for the use of CCDD as fill, the Contractor may elect to dispose of construction debris as a waste.
- B. If the Contractor chooses to dispose of construction debris as a waste, they must abide by all applicable State and local regulations governing waste disposal.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. All fees associated with using CCDD as fill, including fees imposed by the Illinois EPA are the responsibility of the Contractor and should be included in the Contract price.
- B. It is the Contractors responsibility to check that his list is current prior to removing CCDD from the Site. CCDD used as fill must be at a location approved by the Illinois EPA.
- C. Since the project site is considered an industrial source, if using CCDD from the Site as fill, the Contractor must retain and compensate a third-party licensed professional engineer to certify that the CCDD is uncontaminated. either the Owner nor the Engineer will sign the required certification forms.
- D. The third-party engineer should reference the numerical standards listed in 35 I11.Adm. Code 742, Tiered Approach to Corrective Action Objectives (TACO) for making the determination whether the CCDD meets the requirements of uncontaminated soil.

1.7 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for Submittals.
- B. Design Data:
 - 1. Name and Location of CCDD fill operation.
 - 2. Name, location, and contact information for Licensed Professional Engineer retained to certify that the soil is uncontaminated.
 - 3. Copies of any chemical analysis reports and engineering reports prepared to certify that the soil is uncontaminated.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 02 41 00

SECTION 02 50 00 – SITE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Pavement Removal.
 - 2. Aggregate Base Course.
 - 3. Hot Mix Asphalt (HMA) Pavement Patching
 - 4. Concrete Patching.
 - 5. Erosion, Sediment Control and Restoration.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 SUBMITTALS

- A. Process all submittals per requirements in Section 013300 – Submittal Procedures.
- B. Shop Drawings: Submit Shop Drawings pertaining to fabrication, bending and placement of concrete reinforcements.
 - 1. Comply with the ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures.”
 - 2. Show bar schedules, diagrams of bent bars, and arrangements of concrete reinforcement. Include special reinforcement required at openings through concrete structures.
- C. Test Reports: Submit 3 copies of laboratory test reports for concrete materials and mix design tests including potential for alkali-silica reaction (ASR).
- D. Product Data: Submit manufacturer’s data on fiber reinforcement, additives, curing agents, sealers, grouts, joint materials and similar pre-manufactured products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Comply with the latest edition of each of the following:
1. "Specifications for Ready Mixed Concrete" (ASTM C 94).
 2. "Guide to Concrete Floor and Slab Construction" (ACI 302.1).
 3. "Recommended Practice for Hot Weather Concreting" (ACI 305).
 4. "Recommended Practice for Winter Concreting" (ACI 306).
 5. "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete" (ACI 304).
 6. IDOT Standard Specifications
 7. AI MS-22 (2001; 2nd Ed) Construction of Hot-Mix Asphalt Pavements
- D. Provide protection during the construction period for all floor slabs, from oil, grease, stains, discoloration and other physical damage.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

Refer to Part 3 - Execution

PART 3 - EXECUTION

3.1 PAVEMENT REMOVAL

- A. This work shall consist of removing existing pavement and base course as required to facilitate construction. All work shall conform to Section 440 of the IDOT Standard Specifications for Road and Bridge Construction, current edition.

3.2 AGGREGATE BASE COURSE, TYPE B

- A. The Contractor shall furnish and place 10" minimum thickness of aggregate base course, Type B, for pavement patching where ever existing pavement is disturbed by the work. Base course shall be placed in two 5" minimum compacted lifts, using new CA-2 in the bottom half and new CA-10 in the top half. All work shall be in accordance with Section 351 of the IDOT Standard Specifications.
- B. A mixture of sand and clay will not be allowed for aggregate base course materials. This item shall include all sub-grade preparation, as well as the removal and disposal of all excess materials to an acceptable site. The Contractor shall compact the aggregate base course and pay for a sufficient number of compaction tests as determined by the District. Compaction tests must be performed as work progresses.
- C. A prime coat shall be provided over aggregate base courses: MC-30, in accordance with Section 406.02 of the IDOT Standard Specifications for Road and Bridge Construction.
- D. All compaction tests must meet 100% of the Standard Proctor Density, and be performed by an approved independent geotechnical company. All aggregate base course defects shall be corrected in a manner acceptable to the District, at no additional cost.
- E. The work shall include all labor, equipment, materials, transportation, supervision and all other services necessary to complete the specified work, including site preparation, earth excavation, removal, disposal, grading and restoration.

3.3 HMA PAVEMENT PATCHING

- A. General
 1. Hot mix asphalt pavement that is damaged or removed by the work shall be replaced. This work shall be completed in accordance with Section 406 of the IDOT Standard Specifications. Surface Course shall be mixture composition IL 9.5 or IL 12.5, Mix C, N50. Binder Course shall be mixture composition IL 12.5, N50.
 2. Mix designs and materials inspection reports must be submitted to the District for approval prior to construction.
 3. The Contractor shall retain an independent laboratory to complete extraction testing at the plant and in-place density testing.
 4. Article 406.06(g) shall be modified to read: "To ensure thorough and continuous bond between old and new pavements, or between successive day's work or when

the temperatures of the previously laid materials drops below 150 degrees the contact surface shall be sprayed or painted with a thin, uniform RC 70 asphalt tack coat.”

- B. Prime Coat
 - 1. Asphalt RC-70 shall be used for constructing this item and shall be applied at the rate within the limits and in the locations specified in the Standard Specifications for Road and Bridge Construction.
- C. Hot Mix Asphalt – Minimum Replacement Thickness
 - 1. HMA for all pavement patching shall consist of 3” minimum of Hot Mix Asphalt, Mixture C, N50, placed in two compacted 1½” lifts (1½” of Binder Course and 1½” of Surface Course), with separate prime coats provided between pavement lifts, as directed by the District.

3.4 FORM MATERIALS

- A. Form Facings for Unexposed Concrete: Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- B. Form Coatings: Commercial formulation intended for form coating which will not bond with, stain, or adversely affect concrete surfaces, and which will not impair bond or adhesion of subsequent treatments nor impede wetting of surfaces to be cured with water or curing compound.
- C. Form Ties:
 - 1. Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 2. Configured so as to leave no metal closer than 1" to the surface of the concrete.

3.5 STEEL REINFORCEMENT

- A. Materials
 - 1. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
 - 2. Tie Wire: Cold drawn steel wire meeting ASTM A 82.
 - 3. Welded Wire Fabric: Per ASTM A 185.
 - 4. Reinforcing Bar Holders: Galvanized or plastic coated when within 3/4" of exposed concrete surface.
 - 5. Epoxy Adhesive: Provide epoxy adhesive for dowels to be drilled and secured into existing concrete. Refer to Section 07 92 00 – Joint Sealants.
- B. Fabrication:
 - 1. No lapped splices for tension and compression bars unless noted on the Drawings or approved. Locate splices in temperature bars so that no more than half the bars are spliced at any point. Lap splices 36 diameters.
 - 2. Label bars to identify grade of steel and to facilitate placing.
- C. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

3.6 CONCRETE PATCHING

A. General

1. Any existing concrete slab, curb and or gutter disturbed in the execution of the work shall be repaired.
2. The concrete shall be placed on a minimum 10" bed of compacted CA-6 crushed stone. The replacement concrete materials shall match the shape and grades of the adjacent existing materials. Concrete shall be a 4,500 psi full air mix (6%+/-).
3. This work shall be completed in accordance with the IDOT Standard Specifications.
4. Concrete mix designs and materials must be submitted to the District for approval prior to construction.

3.7 EROSION AND SEDIMENT CONTROL AND RESTORATION

A. General

1. The Contractor shall comply with all the requirements of the IEPA Standard Specifications for Soil Erosion and Sediment Control as contained in IEPA/WPC/87-012 or current edition and the requirements of the City of Rockford..
2. The Contractor shall take whatever measures the District deems necessary to eliminate excessive erosion or siltation. This shall include but is not limited to: straw baling of ditches, stabilizing slopes with an approved geo-fabric and/or mulch, seeding, sodding, silt fence installation, inlet protection, rip rap, etc. Sediment control shall be provided around all stockpile perimeters.
3. Provisions shall be made to minimize the transport of sediment (mud) by runoff or vehicle tracking onto roadways. Mud and debris shall be removed daily from roadway surfaces at the end of each workday or as necessary.
4. The Contractor shall remove and dispose of all temporary erosion control devices within 30 days of final site stabilization and District approval.
5. This item shall include all labor, equipment, materials and supervision required to provide erosion control, including, but is not limited to: straw baling of ditches, stabilizing slopes with an approved geo-fabric and/or mulch, silt fences, sodding, etc. Actual field conditions may require additional measures beyond those cited.
6. The Contractor shall maintain stormwater flow in all ditches and storm water conveyance systems (inlets, culverts, pipes, etc.) disturbed as a result of construction. Ditches shall be rough-graded at the end of each day and whenever rain is imminent.
7. The Contractor shall follow the procedures and standards of the "Illinois Urban Manual" (latest edition). Retrieval of some erosion control devices may be required after stabilization has been achieved.

B. Silt Fence

1. Silt fence shall meet requirements of ASHTO M-299. Posts shall be 1.5"x1.5"x4" long, minimum. Post spacing shall be 5' on center, maximum. Silt fencing shall be installed prior to excavation or stockpiling of materials.

C. Storm Inlet Protection

1. This work shall consist of the furnishing, installing, maintaining and retrieval of District-approved drainage inlet protection filters to retain storm water runoff sediment as required or as directed by the District. Filters shall be 9" or 12" diameter sediment logs, erosion eels or straw wattles as manufactured by North American Green (or District-approved equal).
2. The Contractor shall inspect the work site and review the plans to determine the sizes, types and numbers of inlet protection filters needed.

3. Drainage inlet filters shall remain in place until final removal is directed by the District. Filters shall remain the property of the Contractor. Filter removal shall include the disposal of all debris or silt accumulations.

D. Notice of Intent (NOI)

1. Due to the small area affected by construction a "Notice of Intent" (NOI) has not been filed with the IEPA and a SWPPP has not been prepared. However, the Contractor shall comply with general NOI best management practices, appropriate for the site conditions and circumstances, and shall maintain an on-site inventory of all erosion and sediment control equipment and materials needed for the duration of the project.

E. Restoration: Seeding, Fertilizing and Mulching

1. All grass areas disturbed by construction shall be seeded as directed by the District. This work shall consist of fortifying all disturbed areas with 6" of quality topsoil and seeding.
2. Seeding shall be placed on six-inch (6") minimum topsoil bed. The District shall approve the locations from which the topsoil is to be obtained. A sample of the proposed topsoil shall be submitted to the District in a one-quart glass container, completely filled. When requested, the Contractor shall furnish (and pay for) a chemical and mechanical analysis of the topsoil by an approved independent testing laboratory. Topsoil material shall be indigenous to Winnebago County and may be used providing it meets with the requirements of Article 1081.05 of the IDOT Standard Specifications and has no more than 55% sand content as determined in accordance with ASHTO T-88.
3. The seeding method shall consist of applying seed, fertilizer, and wood mulch on a prepared seed bed in accordance with IDOT Section 250 and 251, insofar as said sections apply.

Water Tolerant Class: IDOT 4B or Mesic Prairie mix.

Seeding Class I:

Revise IDOT Article 250.07 to read: "Regardless of season, all disturbed areas shall be seeded with the following mixture:

Kentucky Bluegrass	100 lbs./acre	
Manhattan Rye	100 lbs./acre	OR EQUAL
Ruby Creeping Red Fescue	100 lbs./acre	

Seeding will be permitted from April 1 to May 30 and from August 1 to October 10, unless approved by the District.

Fertilizer shall be furnished and applied to the following nutrients and percentages by weight in pounds:

Nitrogen	6%	
Phosphorus	24%	OR BY SOIL ANALYSIS
Potassium	24%	

Fertilizer shall be applied at a rate of 300 lbs./acre. Second fertilizer application three weeks after seeding of 10-10-10, 250 lbs./acre, if good stand is achieved.

Wood Fiber Mulch: This specification describes mulch consisting of prepared wood cellulose fiber, for use with hydraulically applied grass seed. For non-hydraulically applied seeding, use hand application methods of straw or fabricated mat.

The mulch shall be processed in such a manner that it will contain no growth or germination inhibiting factors and shall be dyed an appropriate color to facilitate metering of materials.

After addition and agitation in slurry tanks with fertilizers, the grass seeds, water and any other approved additives and fibers in the material shall form a uniform suspension in a homogeneous slurry; and that when hydraulically applied to the ground, the material will form a blotter-like ground cover impregnated with uniformly distributed grass seed, and which after application, will allow the absorption of moisture and percolation of natural or mechanical watering to the underlying soil.

The mulch material shall be supplied in packages having a gross weight not in excess of 75 lbs. The packages shall be adequately wrapped in paper, polyethylene or other suitable material to prevent loss or spillage during handling. Wood mulch shall be applied at the rate of 0.5 tons/acre. The weight specifications of this material from suppliers, and for all applications, shall refer only to air dry weight of the fiber material.

The absolute air-dry weight is based on the normal weight standard of the technical Association of the Pulp and Paper Industry for wood cellulose and is considered equivalent to 10% moisture. The manufacturer shall label the air-dry weight content on each package of cellulose fiber.

Suppliers shall certify that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements based upon such testing.

Guarantee: All seeded areas shall be maintained for at least 30 days after application. Scattered bare spots no larger than two square feet will be allowed up to a maximum of 5% of any seeded area, but shall be re-seeded by hand.

Reference is made to T.S. 4:2 of the "General Provisions and Technical Specifications for Sanitary Sewer Construction" for specifications on seeding, sodding, fertilizing and mulching and to Sections 250, 251, and 252 of the IDOT Standard Specifications and current Supplemental Specifications.

At the direction of the District, the Contractor shall provide steep slope protection over turf areas disturbed by construction in accordance with Sections 251.03 and 251.04 of the Standard Specifications.

F. Payment

All costs of Restoration shall be included in the lump sum contract price.

END OF SECTION 02 50 00

Not to be used for bidding purposes

SECTION 07 84 00 - FIRESTOPPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E119	(2012) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E1399	(1997; R 2009) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
ASTM E1966	(2007; R 2011) Fire-Resistive Joint Systems
ASTM E2174	(2010ae1) Standard Practice for On-Site Inspection of Installed Fire Stops
ASTM E2307	(2010) Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus
ASTM E2393	(2010a) Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
ASTM E814	(2011a) Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	(2012) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM AS 4991	(2001) Approval of Firestop Contractors

UNDERWRITERS LABORATORIES (UL)

UL 1479	(2003; Reprint Mar 2010) Fire Tests of Through-Penetration Firestops
UL 2079	(2004; Reprint Jun 2008) Tests for Fire Resistance of Building Joint Systems
UL 723	(2008; Reprint Sep 2010) Test for Surface Burning Characteristics of Building Materials

UL Fire Resistance

(2012) Fire Resistance Directory

1.2 SYSTEM DESCRIPTION

A. General

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps.

1. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents.
2. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint.
3. Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above and at the intersection of shaft assemblies and adjoining fire resistance rated assemblies.

B. Sequencing

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials, at building joints and construction gaps, prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible. Firestop material shall be inspected and approved prior to final completion and enclosing of any assemblies that may conceal installed firestop.

C. Submittals Requirements

1. Submit detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal shall indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" "T" and "L" ratings, and type of application.
2. Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer shall provide certification from UL of passing the "Aging and Environmental Exposure Testing " portion of UL 1479.
3. Submit documentation of training and experience for Installer.
4. Submit manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 SUBMITTALS

Submittals are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

A. Shop Drawings

Firestopping Materials

B. Certificates

Manufacturer's Technical Representative
Firestopping Materials.
Installer Qualifications

1.4 QUALITY ASSURANCE

A. Installer

Engage an experienced Installer who is:

1. FM Research approved in accordance with FM AS 4991, operating as a UL Certified Firestop Contractor, or
2. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in accordance with specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures. The installer shall obtain from the manufacturer written certification of training, and retain proof of certification for duration of firestop installation.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements. Remove damaged or deteriorated materials from the site.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Provide firestopping materials, supplied from a single domestic manufacturer, consisting of commercially manufactured, asbestos-free, nontoxic, water-based, noncombustible products FM APP GUIDE approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

A. Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

B. Toxicity

Material shall be nontoxic and carcinogen free to humans at all stages of application or during fire conditions and shall not contain hazardous chemicals or require harmful chemicals to clean material or equipment. Firestop material must be free from Ethylene Glycol, PCB, MEK, or other types of hazardous chemicals.

C. Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM APP GUIDE approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Where required, firestop systems shall also have "T" rating at least equal to the fire-rated floor in which the openings are to be protected.

1. Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SYSTEM DESCRIPTION, shall provide "F", "T" and "L" fire resistance ratings in accordance with ASTM E814 or UL 1479. Fire resistance ratings shall be as follows:

- a. Penetrations of Fire Resistance Rated Walls and Partitions: F Rating = 1.5 hour rating of wall or partition being penetrated.
- b. Penetrations of Fire Resistance Rated Floors, Floor-Ceiling Assemblies and the ceiling membrane of Roof-Ceiling Assemblies: F Rating = 1.5 hour, T Rating = 1.5 hour. Where the penetrating item is outside of a wall cavity the F rating and T rating must be equal to the fire resistance rating of the floor penetrated.

2. Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SYSTEM DESCRIPTION, and gaps such as those between floor slabs or roof decks and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E119, ASTM E1966 or UL 2079 to meet the required fire resistance rating. Curtain wall joints shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E2307 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E1399 or UL 2079. All joints at the intersection of the top of a fire resistance rated wall and the underside of a fire-rated floor, floor ceiling, or roof ceiling assembly shall provide a minimum class II movement capability.

D. Material Performance

All firestop materials are subject to these minimum standards of performance.

1. Firestop material shall be capable of installation at temperatures of 35 to 120 degrees F.
2. Material must be able to be frozen, thawed and still maintain manufacturer approval for installation.
3. Firestop material must convey a manufacturer's written warranty guaranteeing the performance of the material for the sustainable lifetime of the structure.
4. Material must maintain a shelf life of no less than two years from date of manufacturing.

5. Acceptable firestop cast-in-place devices are factory assembled intumescent lined round or oval plastic cylinders capable of protecting plastic, metallic, cable, and blank openings through the cast-in-place device equal to the fire-resistance rating of the floor.

PART 3 EXECUTION

3.1 PREPARATION

- A. Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement shall be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

3.2 INSTALLATION

- A. Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

1. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.
2. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.
3. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.
4. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.
5. Construction joints in floors and fire rated walls and partitions.
6. Other locations where required to maintain fire resistance rating of the construction.

- B. Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Replace thermal insulation with a material having equal thermal insulating and firestopping characteristics.

- C. Data and Communication Cabling

Cabling for data and communication applications shall be sealed with re-enterable firestopping products. Firestopping devices shall be pre-manufactured modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0% to 100% visual fill of penetrants; while maintaining "L" rating of <5 cfm/sf at 0% to 100% visual fill. Each device must be capable of retrofit applications and be available in square and round configurations, with single, double, triple and six-plex bracket systems provided. Firestop devices must also allow for plastic pipe, metallic pipe, and mixed multiple penetrations through a single device.

END OF SECTION 07 84 00

Not to be used for bidding purposes

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.
5. Silyl-terminated polyether joint sealants.
6. Mildew-resistant joint sealants.
7. Polysulfide joint sealants.
8. Butyl joint sealants.
9. Latex joint sealants.

- B. Related Requirements:

1. Section 07 84 00 "Firestopping" for penetrations through fire rated assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.

- B. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

- B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

- 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
- 2. When joint substrates are wet.
- 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
- 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: Match existing finishes.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

2.5 IMMERSIBLE JOINT SEALANTS

- A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 1; tested in deionized water unless otherwise indicated
- B. Urethane, Immersible, S, NS, 100/50, NT, I: Immersible, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, and I.

2.6 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

- A. STPE, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation; Construction Systems.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.

- c. Pecora Corporation.

2.7 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. STPE, Mildew Resistant, S, NS, 50, NT: Mildew-resistant, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

2.8 POLYSULFIDE JOINT SEALANTS

- A. Polysulfide, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.

2.9 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Bostik, Inc.

2.10 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade F.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Franklin International.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.

2.11 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alcot Plastics Ltd.
 - b. BASF Corporation; Construction Systems.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin or Type B (bicellular material with a surface skin, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.12 EPOXY ADHESIVE

- A. Epoxy adhesive Anchoring System: Injectable two-component epoxy adhesive. Components are contained separate dual-cylinder packs and combined when dispensed. Provide components approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti HIT-RE 500-SD.

2.13 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide flush joint profile according to Figure 8B in ASTM C 1193.
- G. Epoxy Adhesive: Install adhesive where threaded inserts or reinforcing bar is installed in existing concrete.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 2. Joint Sealant: Urethane, M, P, 50, T, NT.
 3. Joint-Sealant Color: Match existing.

- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in exterior insulation and finish systems.
 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 3. Joint-Sealant Color: Match existing.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 2. Joint Sealant: Urethane, S, P, 25, T, NT.
 3. Joint-Sealant Color: Match existing.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Vertical joints on exposed surfaces of unit masonry walls.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: Match existing.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: Match existing.

END OF SECTION 07 92 00

SECTION 26 00 00 – BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 ELECTRICAL CHARACTERISTICS

- A. Electrical characteristics for this project shall be 12.47kV for the primary service and 480V for the secondary service. Final connections to the medium voltage switchgear shall be made by the Contractor as directed by the Owner.

1.2 SUMMARY OF WORK

Adhere to the Construction Phasing Plan for sequencing all work.

A. Site (Substation 3-6):

1. Existing transformers T-3 and T-6 shall be removed and delivered to the Owner.
2. Existing 1600A Power Center will be removed; the Owner has the right to extract any serviceable components from the gear before it is removed from the site.
3. Existing medium voltage feeders to from T-3 and T-6 will be removed along with the associated fuses in the MV switchgear.
4. Existing low voltage feeders from Power Center 2 to the Admin-2 Building, Admin-3 Building, and AquaNereda MCC will be removed.
5. Perform a detailed site survey to accurately locate all underground utilities prior to beginning site excavation.
6. Perform a detailed layout of the new switchgear location and ductbank routing to be approved by the Owner prior to site excavation.
7. Perform excavation for the new switchgear pad, retaining wall, and ductbank.
8. Complete conduit rough-ins, switchgear pad, and ductbank installation.
9. Deliver and Install the new Transformer T-3 and Switchgear 3-6. Coordinate with the Owner for obtaining the refurbished Transformer T-6 and install the transformer.
10. Install new fuses and medium voltage feeders from the medium voltage switchgear to the new Transformer T-3, and refurbished Transformer T-6 provided by the Owner.
11. Install new feeders to the Admin-2 Building, Admin-3 Building, and AquaNereda Facility.
12. Complete testing and verification on all new feeders.
13. Complete manufacturers bench testing and checkout of all new electrical equipment.
14. New switchboard will be load tested, IR scanned and commissioned.
15. Complete all final connections and cutover power to the new Switchgear 3-6.

B. Admin-2 Building.

1. Remove feeder from Power Center 2 to Exterior Distribution Panel.
2. Remove Junction Box and Exterior Distribution Panel.
3. Remove all feeders from the Exterior Distribution Panel.
4. Install new Distribution Panel MDP and install new feeders to loads.

C. Admin-3 Building.

1. Remove Exterior Junction Box along south wall.
2. Remove feeder from Power Center to Admin-3 Disconnect.
3. Extend Ductbank to Admin-3 feeder conduit.
4. Install new feeders from Switchgear 3-6 to the Admin-3 Disconnect.
5. Install new ductbank to building for future use as a new Main Pump facility.

D. Contractor shall maintain power to all loads during the entire timeframe of the replacement.

1. Contractor shall closely coordinate, plan and schedule all outages and power cutovers with RRWRD Operations. All outages shall be no greater than 60 minutes.
2. Contractor shall provide temporary generator standby power at the AquaNereda Facility once Transformer T-3 has been removed.
3. Provide restoration of power within 30 minutes during regular business hours.

1.3 QUALITY ASSURANCE

A. Standard Products: Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products meeting all material, design and workmanship requirements. Switchgear shall have been in satisfactory commercial or industrial use for 2 years prior to installation. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section. All such materials/equipment are subject to the Engineer's discretion.

B. Material and Equipment Manufacturing Date: All products shall be new and in manufacturer's packaging. Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise. All such materials/equipment are subject to the Engineer's discretion.

1.4 WARRANTY

A. All work and equipment shall be warranted for a period of 2 years from the date of substantial completion unless individual sections contain more stringent requirements. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render prompt and satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.5 SUBMITTALS TYPES

A. Product Data (Shop Drawings): Submit product data for all equipment as described in Section 1.6. Submittal shall include performance and characteristic curves (where applicable). Product Data shall include manufactures catalog information (Cut Sheets). Generally, product data and shop drawings are to be submitted by the vendor. See individual project specifications for further requirements.

- B. Test Reports: Submit data for field/manufacturer/installation testing results with sufficient detail as described in individual sections. See execution sections on individual specification for manufacturer versus contractor responsibilities. See individual project specifications for further requirements.
- C. As-Built Drawings (Final Drawings): See 013300.
- D. Operations & Maintenance Manuals (O&M): See 013300.
- E. See individual specifications for other submittal types and requirements noted in Section 1.6.

1.6 SUBMITTALS

Submittals shall be provided for the following Sections:

Specification Section	Submittal Title	For Review	For Record
260513	Medium-Voltage Cables		
260513-1	Product Data	X	X
260513-2	Test Reports	X	X
260519	Low-Voltage Electrical Power Conductors and Cables		
260519-1	Product Data	X	X
260519-2	Test Reports	X	X
260526	Grounding and Bonding for Electrical Systems		
260526-1	Product Data	X	X
260526-2	Test Reports	X	X
260526-3	As-Built Drawings		X
260526-4	O&M Data		X
260529	Hangers and Supports for Electrical Systems		
260529-1	Product Data		X
260533	Raceways & Boxes for Electrical Systems		
260533-1	Product Data	X	X
260543	Underground Ducts and Raceways for Electrical Systems		
260543-1	Product Data	X	X
260543-2	As-Built Drawings		X
260544	Sleeves and Sleeve Seals for Electrical Raceways and Cabling		
260544-1	Product Data	X	X
260553	Identification for Electrical Systems		
260553-1	Product Data	X	
260800	Electrical Inspections and Testing		
260800-1	Testing Reports	X	X
261219	Liquid Filled, Medium Voltage Transformers		
261219-1	Product Data	X	X
261219-2	Shop Drawings	X	X
261219-3	Test Reports	X	X
261219-4	O&M Data		X
262300	Switchgear		
262413-1	Product Data	X	X
262413-2	Shop Drawings	X	X
262413-3	Test Reports	X	X
262413-4	As-Built Drawings		X
262413-5	O&M Data		X

Specification Section	Submittal Title	For Review	For Record
262416	Panelboards		
262416-1	Product Data	X	X
262416-2	Shop Drawings	X	X
262416-3	As-Built Drawings		X
262416-4	O&M Data		X
262813	Fuses		
262813-1	Product Data	X	X
263600	Transfer Switches		
263600-1	Product Data	X	X
263600-2	Shop Drawings	X	X
263600-3	Test Reports	X	X
263600-4	As-Built Drawings		X
263600-5	O&M Data	X	X
264313	Surge Protection for Low-Voltage Electrical Power Circuits		
264313-1	Product Data	X	X
264313-2	Test Reports		X
270528	Pathways for Communications Systems		
270528-1	Product Data	X	X
270528-2	As-Built Drawings		X
337119	Electrical Underground Ducts and Manholes		
337119-1	Product Data	X	X
337119-2	Shop Drawings	X	X
337119-3	As Built Drawings		X

1.7 DISAPPROVED OR REJECTED SUBMITTALS

- A. If changes are necessary to submittals, the Contractor shall make such changes and submit in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.
- B. Contractor shall make corrections required by the Owner. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; see Article 10 of General Conditions.
- C. Submittals may be rejected and marked "not reviewed" for not complying with requirements. Contractor will be provided notice of missing requirement(s) and a complete resubmittal will be required thereafter.

1.8 APPROVED/ACCEPTED SUBMITTALS

- A. The Owner's approval or acceptance of submittals is not to be construed as a complete check, approval or acceptance and does not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Quality Control requirements of this contract is responsible for the installation.

1.9 POSTED OPERATING INSTRUCTIONS

A. Provide for use by operation and maintenance personnel, operating instructions for each system and principal item of equipment as specified in the technical sections. The operating instructions shall include the following:

1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
2. Start-up procedure, proper adjustment, operating, lubrication, maintenance instructions and shutdown procedures.
3. Safety precautions.
4. The procedure in the event of equipment failure or an emergency.
5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

B. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or defacing.

1.10 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.11 ELECTRICAL REQUIREMENTS

A. Electrical installations shall conform to IEEE C2, NFPA 70 National Electrical Code and requirements specified herein.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

A. Paint electrical equipment to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

- A. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.4 RECORD DOCUMENTS

- A. The Contractor shall keep a detailed up-to-date record, of the manner and location in which installations are actually made, indexing and identifying each feeder, pull box and protective device. Upon completion of the project, the contractor shall modify the project electronic drawing and specification files to incorporate the "as-built condition. Modified documents drawings shall also include:

1. Locations of buried conduit or similar items. Include buried depth.
2. Field changes of dimension or detail.
3. Changes made by field order or change order.
4. Details not on original contract drawings.
5. Changes to circuit numbers.
6. Junction box locations and conduit runs, with trade sizes indicated, for lighting, power, and electrical systems installed.
7. Final panel schedules on drawings matching construction document drawing size.

- B. Provide copies of the documentation in electronic format. Paper copies shall be provided at the Owner's request – the number of paper copies shall be noted at the time of request.

END OF SECTION 26 00 00

SECTION 26 05 13 - MEDIUM-VOLTAGE CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Section 33 7119 - Electrical Underground Ducts and Manholes: Cable racks in manholes.
- B. Section 26 0553 - Identification for Electrical Systems.

1.2 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; Institute of Electrical and Electronic Engineers; 2012.
- B. IEEE 48 - IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV through 765 kV; Institute of Electrical and Electronic Engineers; 1996 (R2003).
- C. NECA/MACSCB 600-2003; Recommended Practice for Installing and Maintaining Medium-Voltage Cable (ANSI).
- D. ICEA S-93-639/NEMA WC 74 - 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy; National Electrical Manufacturers Association; 2006.
- E. ANSI/NETA ATS-2009: Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Testing Association; 2009.
- F. NFPA 70 - National Electrical Code (NEC); National Fire Protection Association; 2011.
- G. AEIC CS8 Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46 kV.
- H. ANSI/ICEA S-94-649 Concentric Neutral Cables, Rated 5 Through 46 kV; 2004.
- I. ANSI/ICEA S-97-682 Standard for Utility Shielded Power Cables Rated 5 through 46 kV; 2007.
- J. ANSI/IEEE Std 400 Acceptance Testing of Medium Voltage Cables.
- K. ANSI/IEEE Std 400.2 - IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF).
- L. IEEE Std 404 - Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV
- M. UL 1072: Medium Voltage Power Cables.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Products: Listed, classified, and marked by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.4 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data: For each type of cable. Include splices, connectors and terminations for cables and cable accessories.
- B. Test Reports: See Project Specification Section # 26 91 00
 - 1. Manufacturer Test Reports (provided by others)
 - 2. Medium-Voltage Cable Checklist
 - 3. Tan-Delta Test Report via Datalogger

1.5 SUBMITTALS FOR RECORD ONLY

- A. As-Built Drawings
- B. O&M Data: Including cable electrical characteristics (trefoil arrangement).

PART 2 PRODUCTS

2.1 STANDARDS

- A. All medium voltage cable shall be UL listed as MV-105 and shall conform to NEMA WC 74

2.2 MANUFACTURERS

- A. Manufacturer: The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any submittals made are for products that meet or exceed the specifications included here.
 - 1. Southwire Company
 - 2. General Cable, Corp.
 - 3. Okonite

2.3 CABLE TYPES

- A. 15kV, CU, Tape Shield, Tray Listed Cable.
 - 1. Insulation: 133%
 - 2. Construction:
 - a. Conductor: Solid or concentric lay annealed copper meeting the requirements of ANSI/ICEA S-97-682. Size shall be as shown on drawings.
 - b. Conductor Shield: Extruded semi-conducting thermosetting polymeric stress control layer. Shall meet resistivity requirements of section 3.3 of ICEA S-93-639 for discharge-free designs and non-conducting high permittivity compound for discharge-resistant designs. Material shall be clean stripping from the conductor and firmly bonded to the overlying insulation.
 - c. Insulation: Ethylene Propylene Rubber (EPR) as defined in ANSI/ICEA S-97-682: 133% insulation level
 - d. Insulation shield: The insulation shield shall consist of an extruded semiconducting thermosetting layer directly over the insulation. The insulation shield shall meet all requirements of section 5 of ICEA S-93-639.
 - e. Tape Shield: 5 mil annealed copper tape with an overlap of 25%.

- f. Jacket: Low-friction, lead-free, flame-retardant, moisture-and sunlight resistant Polyvinyl Chloride (PVC).
- g. UL Listed and marked for Cable Tray (CT) use.

2.4 ACCESSORIES

A. Fireproofing tape:

- 1. Product: Scotch brand #77. Thickness 30 mil (0.030 inch); insulation value 500 volts per mil.

2.5 LUGS

- A. Use compression or irreversible type lugs on all terminations. Standard mechanical lugs are not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that conduit, duct, tray, or manholes are ready to receive cable.
- B. Verify field measurements.
- C. Verify routing and termination locations of cable bank prior to installation.
- D. Cable routing on project drawings is shown in approximate locations, unless specifically dimensioned. Route as required to complete wiring system.

3.2 PREPARATION

- A. Pump any water out of the manholes before beginning work.
- B. Use swab to clean ducts before pulling cables. Use a mandrel/swab that is approximately 0.25 inch smaller than the duct diameter. Remove all foreign material from the ducts. Use video inspection equipment to verify condition of all conduits that mandrel/swab was unable to travel full length through.
- C. Cables shall be installed from an outdoor location when the outdoor air temperature is within the manufacturer's recommended temperature range.
- D. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment shall include, but shall not limited to, sheaves, winches, cable reels and/or cable reel jacks, duct entrance funnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices that may move or wear in a manner to pose a hazard to the cable shall not be used.

3.3 INSTALLATION

- A. Avoid abrasion and other damage to cables during installation.
- B. Cable ends shall be sealed and firmly held in the pulling device during the pulling operation.

- C. Use suitable lubricants and pulling equipment. Lubricant shall be of a type that is not harmful to the cable material used. Lubricant shall not harden or become adhesive with age.
- D. Sustain cable pulling tensions and bending radii below recommended limits. Cable pulling shall be done in accordance with cable manufacturer's recommendations, except as modified herein, and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Manufacturer's recommended pulling tensions shall not be exceeded. Pulling bending radius shall not be less than that determined by the manufacturer or the NEC. Restrictions of pulling bending radius dimensions shall be strictly observed. Training bending radius shall not be less than 12 times cable diameter. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
- E. Record log of actual pulling tensions measured for each duct bank segment.
- F. During pulling operation an adequate number of persons shall be present to allow cable observation at all points of duct entry and exit as well as to feed cable and operate pulling machinery.
- G. Ground cable shield at each termination.
- H. Install cables in manholes along wall providing longest route, or on center support rack.
- I. Arrange cable in manholes to avoid interference with duct and personnel entrances.
- J. Fireproof cables in manholes using fireproofing tape in half-lapped wrapping. Follow tape manufacturer's installation instructions. Extend fireproofing 1 inch into duct. Use Scotch #77W electrical arc and fireproofing tape, or approved equal. Apply Scotch #69 Glass Cloth Tape over ends of fireproofing tape, to keep the fireproofing tape from unraveling.
- K. Where cables are left in manhole or switchgear overnight for more than 8 hours prior to termination, the cable ends shall be sealed with paraffin or heat shrink caps and supported in a manner that will prevent entrance of moisture into the cable. Cable shall be terminated and energized as soon as possible.
- L. Cables entering switchgear and transformer termination compartments shall be routed in a manner that will allow adequate room for bending and terminating cables. Cables must be secured in a manner that will not result in cable weight being placed on the termination electrical joint. Cable support shall be made in a manner that does not force cable against grounded metal or that would compress the cable diameter. Cable training bending radius shall be at least 12 times the cable diameter. Any cable bent to a radius less than recommended dimension shall be replaced.
- M. During entire cable installation, phasing of conductors shall be maintained and identified. Where final connections to equipment are made, phasing shall be verified and proper phase rotation determined prior to connection. Verify by "hot phase" test that cables on loop and tie circuits are matched phase-to-phase at every splice or termination that occurs at an open point. Use an approved live-line phasing meter and follow safety and switching procedures. This test may only be performed by personnel experienced in and qualified for testing of energized circuits. Do not rely on color markings for assurance of proper phasing. Verify correct phase rotation when cables on radial circuits are replaced. Use approved secondary voltage rotation testers or verify that rotation of existing motors is correct.
- N. Identify conductors according to Section 26 05 53 – Identification for Electrical Systems.

3.4 TERMINATIONS

- A. Field fabricate terminations from termination kits supplied by, and in accordance with, the termination manufacturer's recommendations for the type, size, and electrical characteristics of the cable specified.
- B. Field fabricate cable splices from pre-molded or heat-shrinkable splicing kits supplied by, and in accordance with, the cable manufacturer's recommendations for the type, size, and electrical characteristics of the cable specified. Locate cable splices in manholes midway between cable racks on walls of manholes and supported with cable arms at approximately the same elevation as the enclosing duct.

3.5 FIELD QUALITY CONTROL

- A. Perform field inspection.
- B. Inspect exposed cable sections for physical damage.
- C. Cable Reel Acceptance Inspection (Reel Inspection) is a preliminary inspection to be performed after the cable is received from the shipper. This inspection should be performed as soon as possible after receipt of the shipment, and is intended to verify that the cable has been received from the shipper in sound condition and without manufacturing defects. If the cable does not pass, the reel shall be returned to the manufacturer. The minimum basic required inspection includes the following:
 - 1. Record Reel basic information, if not already included on the manufacturer's certified test report:
 - a. Cable ID.
 - b. Manufacturer's name.
 - c. Conductor material.
 - d. Conductor size.
 - e. Insulation type and thickness.
 - f. Jacket thickness.
 - g. Temperature rating.
 - h. Length of the cable.
 - i. Voltage class.
 - j. Shielded or non-shielded.
 - k. Date of manufacture.
 - l. Inspection date.
 - m. Inspector identity.
 - 2. Inspect cable and record any visible signs of defect. Document any damage photographically.
 - 3. Confirm that the cable specified was received.
 - 4. Verify that the cable end seals are intact.
- D. Inspect cable for proper connections as indicated.
- E. Inspect shield grounding, cable supports and terminations for proper installation.
- F. Perform inspections and tests listed in ANSI/NETA ATS-2009, Section 7.3.3 (Cables, Medium- and High-Voltage). Acceptance tests shall be performed on all cable after installation and prior to energization. All splices and terminations are to be completed and tested as part of the acceptance test. Perform insulation resistance testing using Tan-Delta.

G. All testing shall be performed based on the Table 5 (Tan-Delta test voltage for sinusoidal wave form) from the IEEE 400.2 Standard shown below.

Cable Rating, Phase-Phase	Installation, Phase-Ground	Acceptance, Phase-Ground	Maintenance, Phase-Ground
RMS voltage, kV	RMS (Peak) kV	RMS (Peak) kV	RMS (Peak) kV
5	9 (13)	10 (14)	7 (10)
8	11 (16)	13 (18)	10 (14)
15	18 (25)	20 (28)	16 (22)

H. Acceptance Test. This test shall be performed after all terminations and splices have been made and inspected, and prior to connections to equipment. Acceptance testing is performed to detect any defects in cable insulation and termination which may have resulted from poor workmanship or mechanical damage. This proof test confirms the integrity of the insulation and accessories before the cable is placed into service. The minimum basic required test procedure is as follows:

1. Record basic information.
 - a. Pad ID
 - b. Cable ID
 - c. Test Date
 - d. Test crew identities
 - e. Tan-Delta cable test set model and serial number.
2. The test personnel shall be familiar with the cables involved, cables route, the location of open points, where the cables or joints may be accessible, and the types of cable constructions used.
3. Inspect exposed cable and record any visible signs of damage.
4. Each conductor shall be individually tested with all other conductors grounded. All shields shall be grounded. Cable ends, both at test location and remote, should be protected from accidental contact by personnel, energized equipment, and grounds.
5. Provide adequate clearance (no less than 2.5 ft) between the circuit test ends and any grounded object, and to other equipment not under test.
6. Each cable shall be tested for a 30-minute period (IEEE Std 400.2-2004, paragraph 5.1.1).
7. A shield continuity test shall be performed by the ohmmeter method. The ohmic value shall be recorded.
8. At the conclusion or at an interruption of a Tan-Delta test, the test object should be grounded immediately.
9. All tests results shall be maintained in a written record.

I. All testing must be documented. Acceptance test documentation also forms the basis for future troubleshooting, emergency restoration, and quality control. See Section 26 91 00 – Field Acceptance Reports attachments for Medium-Voltage Cable Checklist.

J. In the event that test results are not satisfactory, the Contractor shall make repairs and replace components as necessary to correct faults. Following corrections, tests will be repeated to the extent required to prove the deficiencies are corrected.

K. Inspect cable for proper termination as indicated in the construction documentation and in the manufacturer's instructions.

3.6 PROTECTION

- A. Protect installed cables from entrance of moisture.
- B. Do not store cable reels flat position.
- C. Apply water-tight seals to cable ends while full or partial spools are stored on-site.
- D. Provide lifting bar through cable reel, to move reels. Do not place sling on cables.

END OF SECTION 26 05 13

Not to be used for bidding purposes

Not to be used for bidding purposes

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

A. The Section includes the following:

1. Building wire and cables rated 600 V and less.
2. Connectors, splices and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.

B. Related Sections include the following:

1. Section 27 15 00 – Communications Horizontal Cabling

1.2 REFERENCES

A. ANSI/NFPA 70 – National Electrical Code (NEC) 2008

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.4 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

1.5 SUBMITTALS FOR RECORD ONLY

A. Product Data

B. Test Reports: See Project Specification Section # 26 91 00

1. Low-Voltage Cable Checklist
2. Test Report

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors only: Comply with NEMA WC 70.

B. Conductor Insulation: THHN/THWN for indoor locations. XHHW-2 for underground and damp locations.

2.2 CONNECTORS

- A. Description: Factory-fabricated connectors of size, ampacity rating, material, type and class for application and service indicated.
1. Spring Wire Connectors: Corrosion resistant, insulated sheath, 105°C, single color coded type.
 2. Connectors and Lugs shall be circumferential compression or mechanical set screw type.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper, Stranded for all AWG sizes.
- B. Branch Circuits: Copper, Stranded for all AWG sizes.
- C. Motors and equipment connections subject to vibration: Copper. No. 12 AWG and larger, stranded conductor.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Single conductors in raceway.
- B. Exposed Feeders: Single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Single conductors in raceway.
- E. Exposed Branch Circuits: Single conductors in raceway.
- F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Single conductors in raceway.
- G. Class 1 and Class 2 Control Circuits: Single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope and basket-weave wire/cable grips that will not damage cables or raceway.

- D. Install exposed conduits parallel and perpendicular to surfaces of exposed structure members, and follow surface contours where possible.
- E. Support cables according to Section 26 05 29 – Hangers and Supports for Electrical Systems.
- F. Identify and color-code conductors and cables according to Section 26 05 53 – Identification for Electrical Systems.

3.4 ELECTRICAL CONTINUITY OF METAL RACEWAYS AND ENCLOSURES

- A. General: Metal raceways and other metal enclosures for conductors shall be metalically joined together into a continuous electric conductor and shall be connected to all boxes, fittings, and cabinets or enclosures so as to provide an effective ground fault current path per Section 250.4 of the NEC.

3.5 VOLTAGE DROP REQUIREMENTS

- A. Feeders: Feeders shall be sized for maximum voltage drop of 2%.
 - 1. All feeder sizes are to be called out on project drawings. Consult engineer if feeder lengths exceed those noted on one-line diagrams, or where sizes are not noted on project drawings.

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 00.

3.7 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.
 - 2. Perform the following visual and mechanical inspection and electrical tests:
 - a. Verify cable data and wire sizes with drawings and specifications.
 - b. Inspect cables for damage and correct connections per one line diagrams.
 - c. Verify tightness of connections, and test connections for high resistance.
 - d. Inspect for correct phase arrangements and jacket insulation.
- B. Test Reports: For test results that do not comply with requirements, take corrective action taken to achieve compliance with requirements. Re-test cables.
- C. Remove and replace malfunctioning cables and retest as specified above.
- D. Complete Field Acceptance Reports per Section 26 9100 for all feeders.

END OF SECTION 26 05 19

Not to be used for bidding purposes

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes methods and materials for the grounding system and equipment.
- B. Underground distribution grounding.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8/A5.8M (2011; Amendment 2012) Specification for Filler Metals for Brazing and Braze Welding

ASTM INTERNATIONAL (ASTM)

ASTM B3 (2013) Standard Specification for Soft or Annealed Copper Wire

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81 (2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008) National Electrical Code

NFPA 780 (2014) Standard for the Installation of Lightning Protection Systems

UNDERWRITERS LABORATORIES (UL)

UL 467 (2007) Grounding and Bonding Equipment

UL 96 - (2005; Reprint Oct 2010) Standard for Lightning Protection Components

UL 96A (2007; Reprint Oct 2010) Standard for Installation Requirements for Lightning Protection Systems

1.3 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data

1.4 SUBMITTALS FOR RECORD ONLY

- A. Field Test Reports: See Project Specification Section 26 91 00 and 26 08 00
 1. Measure Ground Resistance
 2. Grounding and Bonding Installation Checklist

- B. As-Built Drawings: Update grounding floor plans, locations of ground bars, tails and grounding risers/details.
- C. O&M Data

PART 2 PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
- C. Bonding Conductor: #4 or #6 AWG, stranded.
- D. Bonding Jumper: Copper tape, braided conductors with copper ferrules; 1-5/8" wide x 1/16" thick.
- E. Grounding Bus: Rectangular bars of annealed copper, 1/4" x 2" x 12", unless otherwise indicated mounted on insulators.

2.2 CONNECTORS

- A. Bolted Connectors:
 - 1. Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 2. Pipe Connectors: Clamp type, sized for pipe.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conduits.
- C. Compression Connectors: Irreversible type meeting IEEE Standard 837-2002, UL Listed.
 - 1. Compression Grounding Connectors Burndy "HYGROUND" OE

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch in diameter by 10 feet in length.
- B. Ground plates shall be Thompson #233M Copper plate. Provide ground plates where ground rods cannot be installed.
- C. Grounding Test Wells:
 - 1. Well Pipe: 10" diameter test well extending 4" in diameter to accommodate the 3/4 inch by 10' ground rod. Top of ground rod should be within 6" of finished grade for convenience of measurements.
 - 2. Well Cover: Cast iron, bolted, with "GROUND" embossed on traffic rated cover.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: All conductors to be stranded conductors unless otherwise indicated.

- B. Underground: Install bare copper conductors, #3/0 AWG (unless notes otherwise on project drawings), minimum 30" below grade.
- C. Isolated Ground: Green insulation with yellow stripe.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Exothermic-welded connectors or irreversible compression connectors unless otherwise noted in project drawings.
 - 3. Connections to Structural Steel: Exothermic-welded connectors or clamp connectors unless otherwise noted in project drawings.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit. Connect conduit to ground wire.
- C. Ground Rods:
 - 1. Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 2. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 - 3. Install test wells as shown on design documents. Each test well ground rod will be within 6 inches of finished grade or floor. See test well ground rod requirements above.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors or irreversible connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- E. Ufer Grounding: No. 4 AWG or larger copper conductor to steel reinforcing bar no less than ½" in diameter and to a concrete-encased electrode which shall consist of at least 20 feet of bare copper not smaller than No. 4 AWG encased in 2 inches of concrete near the bottom of the footing or foundation. Ufer grounding to be used when noted on project drawings.
- F. Grounding for Steel Enclosure Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart. Connect to structural steel member with #4/0 bare copper cable.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Confirm that the neutral is grounded only at the service equipment by removing the service neutral grounding conductor and meggering the neutral bus. Disconnect or remove all equipment that could be damaged by megger test before conducting this test.
 3. Test completed grounding system at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 4. Locate each ground rod and ground rod assembly, and other grounding electrodes on drawings. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth to each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Record measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 2. Pad-Mounted Equipment: 5 ohms.
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Project Manager promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.3 SUBMITTALS FOR RECORD ONLY

A. Product Data

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coating: Pre-galvanized or Hot-dip galvanized after fabrication and applied according to MFMA-4.
2. Channel Dimensions: Selected for applicable load criteria.
3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
4. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
5. Rated Strength: Selected to suit applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for type and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to support individual conductors or cables. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars: painted or galvanized.

F. Mounting, Anchoring and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Power-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials. Contractor shall scan

concrete where fasteners are to be used prior to installation to ensure the area is free of embedded conduit or other control lines.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. ASTM A 36A/36M steel plates, shapes, and bars; black and galvanized.

2.3 CONCRETE FORM MATERIALS

- A. Form Facings for Unexposed Concrete: Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- B. Form Coatings: Commercial formulation intended for form coating which will not bond with, stain, or adversely affect concrete surfaces, and which will not impair bond or adhesion of subsequent treatments nor impede wetting of surfaces to be cured with water or curing compound.
- C. Form Ties:
 1. Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 2. Configured so as to leave no metal closer than 1" to the surface of the concrete.

2.4 STEEL REINFORCEMENT

A. A. Materials

1. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
2. Tie Wire: Cold drawn steel wire meeting ASTM A 82.
3. Welded Wire Fabric: Per ASTM A 185.
4. Reinforcing Bar Holders: Galvanized or plastic coated when within 3/4" of exposed concrete surface.
5. Epoxy Adhesive: Provide epoxy adhesive for dowels to be drilled and secured into existing concrete. Refer to Section 07 92 00 – Joint Sealants.

B. Fabrication:

1. No lapped splices for tension and compression bars unless noted on the Drawings or approved. Locate splices in temperature bars so that no more than half the bars are spliced at any point. Lap splices 36 diameters.

2. Label bars to identify grade of steel and to facilitate placing.

C. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.5 CONCRETE MIXTURE

A. General

1. Concrete mix designs and materials must be submitted to the District for approval prior to construction.

B. Mixture

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum W/C Ratio: 0.40.
3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMC as required by NFPA 70. Minimum rod size will be ¼ inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits. Secure raceways and cables to these supports with two-bolt conduit clamps for conduits 1 ¼ inch and larger, single-bolt conduit clamps for conduits 1 inch and smaller.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchoring of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches

thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

5. To Steel:
 - a. Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts
 - b. Beam clamps (MSS Type 19, 21, 23, 25 or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers and other devices on slotted-channel racks attached to substrate.

- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Comply with requirements in Finishes for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- B. Galvanized Surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Section 26 05 29 – Hangers and Supports for Electrical Systems.
 - 2. Section 26 05 43 – Underground Ducts and Raceways for Electrical Systems.

1.2 SUBMITTALS FOR RECORD ONLY

- A. Product Data

PART 2 PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. RGS: ANSI C80.1. Rigid Steel Conduit (Indoor Only)
- B. PRGS ANSI C80.1. PVC Coated Rigid Steel Conduit (Outdoor)
- C. FMC: Zinc-coated steel or aluminum. Flexible Metal Conduit
- D. LFMC: Flexible steel conduit with PVC Jacket. Liquid-tight Flexible Metal Conduit
- E. Fittings for Conduit (Including all Types and Flexible and Liquidtight), and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
- F. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. RNC: NEMA TC 2, Type EPC-40-PVC, in ductbank only unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

2.3 JUNCTION BOXES

- A. Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

- B. Interior. Description: Sheet Metal Boxes, NEMA OS 1.
1. Covers: Nonmetallic gray finish gray baked enamel, concealed trim clamps, screw cover front.
 2. Furnish metal panel for mounting terminal blocks and electrical components as required.
 3. Box Size: As indicated on drawings or per NEC 314.
 4. Furnish nonmetallic barriers to form separate compartments wiring of different systems and voltages.
 5. Finish: Nonmetallic gray finish gray baked enamel.
- C. Exterior. Description: NEMA 250, Type 4X stainless steel enclosure.
1. Covers: Stainless Steel, flush surface type with gasket and concealed trim clamps, screw cover front.
 2. Furnish metal panel for mounting terminal blocks and electrical components as required.
 3. Box Size: As indicated on drawings or per NEC 314.
 4. Furnish nonmetallic barriers to form separate compartments wiring of different systems and voltages.
 5. Finish: Stainless Steel.
- D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Small Sheet Metal, Pull and Junction Boxes: NEMA OS 1.

2.4 TERMINAL BLOCKS

- A. Manufacturer List:
1. Entrelec Inc.
 2. Phoenix Contact.
 3. Weidmuller.
 4. Other manufacturers meeting the requirements of this specification.
- B. Description:
1. Terminal Blocks: NEMA ICS 4.
 2. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
 3. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
 4. Furnish ground bus terminal block, with each connector bonded to enclosure.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Buried Outdoor: PVC Coated Rigid Steel Conduit
 2. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, Stainless Steel.
 3. Concrete Encased Underground Conduit: RNC Type EPC-40-PVC, or RGS.
 4. Connection to Vibrating Equipment: LFMC.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed Indoor: Rigid Steel Conduit.
 2. Concealed in Ceiling and Interior Walls and Partitions: Rigid Steel Conduit.

3. Connection to Vibrating Equipment: FMC, except use LFMC in damp locations, in wet locations or for dry-type transformers 15kVA or larger.
 4. Connections to lighting fixtures in accessible ceilings: FMC –Maximum 72” in length.
 5. Damp or Wet Locations: PVC Coated Rigid steel conduit
 6. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: Rigid Steel Conduit.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 3R in damp or wet locations.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
- D. Electrical nonmetallic tubing (ENT) shall not be used.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete specific raceway installation before starting conductor installation.
- D. Support raceways as specified in Specification Section 26 05 29 – Hangers and Supports for Electrical Systems.
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit.
- G. Conceal conduit within finished walls, ceilings and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
1. Run conduit larger than 1 inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Change from PVC to rigid steel conduit before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- K. Install exposed raceway sealing fittings (seal off) at required and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm or cold locations, such as boundaries of refrigerated spaces.

2. Where otherwise required by NFPA 70.
 - L. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install each expansion-joint fitting with position, mounting and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
 - M. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures, maximum of 36 inches of flexible conduit equipment subject to vibration, noise transmission or movement; and for transformers and motors. Use LFMC in damp locations, in wet locations or for transformers 15kVA or larger.
 - N. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
 - O. Set metal floor boxes level and flush with finished floor surface.
 - P. Install labels on all spare raceways. Label to note to-from location and clearly identify "SPARE."

3.3 OUTLET BOX LOCATIONS

- A. Location of outlets and equipment as shown on drawings is approximate, and exact location shall be verified and shall be determined by:
 1. Construction or code requirements.
 2. Conflict with equipment.
 3. Equipment manufacturer's drawings.
- B. Minor modification in the location of outlets and equipment is considered incidental up to a distance of 10 feet with no additional compensation, provided necessary instructions are given prior to roughing in of outlet.
- C. Metallic electrical outlet boxes may be installed in vertical fire resistant assemblies classified as fire/smoke and smoke partitions without affecting the fire classification of the assembly, provided such devices do not exceed 16 square inches and are located per applicable U.L. assembly code. All clearances between such outlet boxes and the gypsum board must be completely filled with joint compound or other approved materials. The wall must be built around outlets of a larger size so as to not interfere with the integrity of the wall rating. The aggregate surface area of the boxes shall not exceed 100 square inches per 100 square feet. Boxes located on opposite sides of walls or partitions shall be separated by a horizontal distance of 24 inches. The metallic outlet or switch boxes shall be securely fastened to the studs and the openings in the wallboard facing shall be cut so that the clearance between the box and the wallboard does not exceed 1/8 inch.
- D. In general, do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall a minimum of 24 inches or on opposite sides of stud in partition walls. Where back to back boxes cannot be avoided, provide gypsum board between boxes.
- E. Where more than two switches or devices are located at one point use ganged boxes and covers, unless devices do not allow for ganging. Contractor to verify suitability of devices for gang mounting. Provide permanently installed barrier (U.L. Listed) between adjacent switches where required per N.E.C. Article 404.8 or Article 700.9.
- F. Exposed outlet and junction boxes
 1. Cast boxes up to 4'-0" above floor for exposed conduit runs.
 2. Pressed steel boxes acceptable above 4'-0".

3.4 JUNCTION BOX AND PULL BOX LOCATIONS

- A. Install junction and pull boxes in an accessible location.

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07.

3.6 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.7 CLEANING

- A. Clean existing cabinets and enclosures to remain or to be reinstalled.
- B. Clean electrical parts to remove conductive and harmful materials.
- C. Remove dirt and debris from enclosure.
- D. Clean finishes and touch up damage.

END OF SECTION 26 05 33

Not to be used for bidding purposes

SECTION 26 05 43 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks.
2. Handholes and boxes.

B. Related Sections:

1. Section 33 71 19, Electrical Underground Ducts and Manholes

1.2 DELIVERY, STORAGE AND HANDLING

A. Delivery ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping and deforming.

1.3 COORDINATION

A. Coordinate layout and installation of all underground ducts with final arrangement of other utilities, site grading and surface features as determined in the field.

1.4 SUBMITTALS FOR RECORD ONLY

A. Product Data

B. As-Built Drawings

PART 2 PRODUCTS

2.1 CONDUIT

A. PVC Coated Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.

B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

C. Elbows: RNC; use long sweep, minimum bend radius of 36 inches.

2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

A. Conduits encased in concrete: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spaces, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings specified while supporting ducts during concrete placement or backfilling and compacting.

2. Warning Tape: Underground-line warning tape specified in Division 26 Section 260553 - "Identification for Electrical Systems".

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright red-colored, continuous-printed, aluminum backed tape as manufactured by Presco or similar.
 1. Not less than 6 inches wide by 4 mils thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous aluminum strip or core.
 4. Printed legend shall indicate type of underground line.

PART 3 EXECUTION

3.1 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40-PVC, in concrete-encased (dyed red) duct bank, unless otherwise indicated.
- B. Underground Ducts for Communications Service Cables: RNC, NEMA Type EPC-40-PVC, in concrete-encased (dyed red) duct bank, unless otherwise indicated.
- C. Underground Ducts Crossing Driveways and Roadways: RNC, NEMA Type EPC-40-PVC, encased in reinforced (dyed red) concrete.

3.2 UNDERGROUND-LINE WARNING TAPE

- A. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication and control wiring and communications cable. Install underground-line warning tape for both concrete-encased and direct-buried duct banks.
- B. Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.3 EARTHWORK

- A. Excavation and Backfill: See Section 33 71 19, Section 02 50 00, and Drawings Details. Do not use heavy-duty, hydraulic-operated, compaction equipment.

3.4 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down towards manholes and handholes and away from building and equipment where feasible. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations, unless otherwise indicated. Use rigid steel conduit at pulling elbows.

- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane. Use link-seal fittings at all man-hole and foundation wall penetrations.
- D. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compounds and plugs to withstand at least 15-psig hydrostatic pressure.
- E. Pulling Cord: Install 100-lb f-test nylon cord in ducts, including spares.
- F. All 90 degrees bends for conduit 1-1/2" and larger shall be made with a black mastic coated rigid steel conduit elbow.
- G. Concrete-Encased Ducts (dyed red): Support ducts on duct separators.
1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; **do not** use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
 2. Concreting Sequence: If possible, pour each run of envelope between manholes or other terminations in one continuous operation.
 - a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
 - b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch x 36-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.
 3. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.
 4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
 5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
 6. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 15 inches between power and signal ducts.
 7. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.
 8. Stub-Ups: Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.

3.5 GROUNDING

- A. Ground underground ducts and utility structures according to Section 26 05 26 – Grounding and Bonding for Electrical Systems.

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. Demonstrate trade coordination and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull aluminum or wood test mandrel through ducts to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.7 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricate throughout ducts.

END OF SECTION 26 05 43

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 2. Sleeve-seal systems.
 3. Sleeve-seal fittings.
 4. Grout.
 5. Silicone sealants.
- B. Related Requirements:
1. Section 07 84 00 - Firestopping: For penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.
 2. Section 07 92 00 - Joint Sealants.
- C. See Division 27 for telecom sleeve and sleeve seal requirements.

1.2 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data.

PART 2 - PRODUCTS

2.1 PRE-INSTALLED FIRESTOP DEVICES

- A. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
1. Hilti Cast-In Place Firestop Device (CP 680-P) for use with combustible penetrants.
 2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
 3. Hilti Speed Sleeve (CP 653) for use with cable penetrations.
 4. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.

2.2 SLEEVES

- A. Wall / Floor Sleeves:
1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Conduit Penetrations Through Below Grade Walls (non-rated):
 - 1. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or water-stop type wall sleeve.
- C. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- D. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.3 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Link-Seal
 - b. CALPICO, Inc.
 - c. Metraflex Company (The)
 - d. Proco Products, Inc.
 - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Carbon steel.
 - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: Presealed Systems.

2.5 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.

Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during construction of slabs and walls.
- B. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- C. Cut sleeves to length for mounting flush with both wall surfaces.
- D. Extend sleeves installed in floors 2 inches (minimum) above finished floor level.
- E. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors to cable penetrations. Install sleeves and seal with firestop materials according to Division 7 – Thermal and Moisture Protection.
- F. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- G. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals.
- H. Underground Exterior-Wall Penetrations: Install cast-iron “wall pipes” for sleeves.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.

- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 – Thermal and Moisture Protection.
- B. Fire and/or Smoke Penetrations:
 - 1. Install approved product in accordance with the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.
 - 2. Where fire stop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Fire stop mortar alone is not adequate to support any substantial weight.

END OF SECTION 26 05 44

Not to be used for bidding purposes

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Identification for raceways and metal-clad cable.
 - 2. Identification for conductors and communication and control cable.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Instruction signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products (arc flash IDs/etc.).

1.2 COORDINATION

- A. Coordinate identification names, abbreviations, colors and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and in the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout the Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

1.3 SUBMITTALS FOR RECORD ONLY

- A. Product Data
- B. As-Built Drawings: Project drawings with installed equipment names as they appear on name plates and an identification schedule. Identification schedule should note nomenclature of electrical equipment and system components used in identification signs and labels,

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 FLOOR MARKING TAPE

- A. 2" wide, 5 Mil pressure sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed legend shall indicate type of underground line.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES".

2.5 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a black background. Minimum letter height shall be 3/8 inch. Nameplates for A side power shall have yellow text; nameplates for B side power shall have orange text.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping stainless steel screws, except contact type permanent commercial grade adhesive providing a permanent bond shall be used where screwed cannot or should not penetrate substrate.

- B. Two-sided tape and dynamo tape adhesives **are not acceptable.**

2.8 CONDUIT LABELS

- A. General Requirements for Manufactured Conduit Labels: Preprinted, color-coded, and alphanumeric characters indicating system and voltage, per review and coordinate with owner.
- B. Approved Manufacturer: Seton, Kolbi Pipe Marker Co. or equal.
- C. Pretensioned Conduit Labels: Precoiled, semirigid plastic formed to cover full circumference of conduit and to attach to conduit without fasteners or adhesive.
- D. Self-Adhesive Conduit Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Conduit Label Contents: Include identification of conduit service using same designations or abbreviations as used on Drawings.
1. Lettering Size:
 - a. $\frac{3}{4}$ -inch minimum on conduits with OD, less than 6 inches.

PART 3 EXECUTION

3.1 APPLICATION

- A. Accessible Junction Boxes, 600 V or Less, for Service, Feeder, and Branch Circuits: Identify with paint as noted below. Confirm coloring coding scheme.
1. All junction boxes for the shall be painted as follows:
 - a. Telecommunications Systems - ANSI/OSHA Safety Blue (Rust-Oleum #7524838)
 - b. Medium Voltage – Normal Power – ANSI/OSHA Safety Orange (Rust-Oleum #7555838)
 2. Junction boxes and covers shall be painted with the color of the applicable system. In public exposed areas that are painted only, the interior of the junction box and cover shall be painted with the system color.
- B. Power-Circuit Conductor Identification: For primary and secondary conductors in pull boxes, junction boxes and manholes/handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single circuit cables, identify phase in addition to the above.
- C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use marker tape. Identify each ungrounded conductor according to source and circuit number.
- D. At each junction box, the covers on junction boxes and pull boxes in areas that are not to be painted shall be marked with "Indelible Markers" to indicate the circuit number(s) of conductors in the box. In areas where exposed conduit and junction boxes are to be painted, indicate circuit number(s) of conductors in the box on the inside cover of the box.
- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source and circuit number.

- F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and communications cable. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply baked-enamel warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches
 - b. Controls with external control power connections.
 2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- H. Instruction Signs:
1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
 2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer load shedding.
- I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch-high label; where 2 lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealing electrical items.
 - c. Electrical switchgear and switchboards.
 - d. Transformers.
 - e. Disconnect switches.
 - f. Enclosed circuit breakers.
 - g. Motor starters and VFDs.
 - h. Power transfer equipment.
 - i. Contactors.
 - j. Remote-controlled switches, dimmer modules, and control devices.
 - k. Power-generating units.

- J. Engraved laminate signs shall have colors and lettering as follows:
 - 1. Under 600V - Normal Power - Black field with white lettering.
 - 2. Over 600V - Normal Power – Orange field with black lettering.
 - 3. All other Equipment – Black field with white lettering.
- K. Where the electrical system is comprised of normal power and emergency power, the equipment connected to the normal power system shall have engraved laminate signs with white lettering in a black field. Equipment connected to the emergency power system shall have engraved laminate signs with black lettering in a yellow field.
- L. Panelboard identification shall indicate equipment designation, voltage and where fed from, e.g:

SWITCHGEAR 3
277/480V, 3 PHASE, 4 WIRE
FED FROM
TRANSFORMER 3 (TIE OPEN)
TRANSFORMER 6 (TIE CLOSED)

- M. Panelboards located in storage rooms shall have floor space per NFPA 70 (NEC) permanently marked and shall be identified as "Electrical Working Space - Not For Storage."

3.2 COVER PLATES

- A. All wiring device cover plates shall have panel name and circuit number serving device clearly marked (e.g. "1HLA-7") on the back of each faceplate with indelible marker.

3.3 PANELBOARD CIRCUIT DIRECTORIES

- A. Install in each panelboard a typewritten directory accurately indicating rooms and equipment being served. Verify actual room names and numbers to be used. Also, provide a copy of typewritten panelboard directories in Owner's close-out manuals.

3.4 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after finish work is completed.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.
- F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.

2. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: Gray.
 - e. Ground: Green.
 - f. Isolated Ground: Green/Yellow Tracer.
3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- H. Painted Identification: Prepare surface and apply paint according to manufacturer's instructions.
- I. Conduit Label Installation
 1. Conduit labels shall be used on emergency circuits, 277 volt lighting homeruns, communication and feeders.
 2. Locate conduit labels where conduit is exposed or above accessible ceilings in finished spaces; and Electrical rooms as follows;
 - a. Near each floor and ceiling penetration.
 - b. Near each junction box or pull box.
 - c. Near major equipment items and other points of origination and termination.
 - d. Spaced at maximum intervals of 100 feet along each run. Reduce intervals to 50 feet in areas of congested conduit and equipment.
 - e. On conduit above removable acoustical ceilings. Omit intermediately spaced labels.
 - f. Labels shall not be utilized in public spaces.

END OF SECTION 26 05 53

SECTION 26 08 00 - ELECTRICAL INSPECTION AND TESTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

1.2 RELATED REQUIREMENTS

Section 26 00 00 GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Test Reports

Acceptance tests and inspections

Certificates

Qualifications of organization, and lead engineering technician

Acceptance test and inspections procedure

1.4 QUALITY ASSURANCE

A. Qualifications

The owner shall engage the services of a qualified testing organization to provide commissioning services to include inspection, testing, calibration, and adjustment of the electrical distribution system. The contractor shall coordinate with the independent organization on the progress of manufacturer and installer testing of the equipment.

B. Acceptance Tests and Inspections Reports

The owner's commissioning agent shall witness factory Switchgear Design and Production Testing. Submit certified copies of all inspection reports and test reports to the owner's commissioning agent. Reports shall include certification of compliance with specified requirements, identify deficiencies, and corrective actions when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

C. Acceptance Test and Inspections Procedure

The contractor shall perform all installation checklists and acceptance testing per Section 26 91 00 Field Acceptance Testing and NETA ATS. The contractor shall engage the equipment manufacturer to perform equipment field testing per Section 26 23 00 Switchgear. Submit test procedure reports for each item of equipment to be field tested at least 30 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ACCEPTANCE TESTS AND INSPECTIONS

1. The contractor and manufacturer shall perform field acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified.
2. The owner's commissioning agent will witness and verify all testing. Equipment shall be placed in service only after completion of required tests, evaluation of the test results have been completed, and the owner's commissioning agent has approved all testing.
3. Contractor shall supply to the commissioning-testing organization a complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to energization. Engineer shall be notified at least 14 days in advance of when tests will be conducted. Perform acceptance tests and inspections on all applicable equipment and systems.

3.2 SYSTEM ACCEPTANCE

Final acceptance of the system is contingent upon satisfactory completion of all acceptance tests and inspections.

3.3 PLACING EQUIPMENT IN SERVICE

A representative of the Engineer, the owner's commissioning agent, and the manufacturer shall be present when equipment testing is being performed and when equipment is initially energized and placed in service.

END OF SECTION 26 08 00

SECTION 26 09 00 – TEMPORARY ELECTRICAL POWER

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2013) Standard for Testing Specifications for Electrical Power Equipment and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008) National Electrical Code

NFPA 70E (2015) Standard for Electrical Safety in the Workplace

1.2 RELATED REQUIREMENTS

Section 26 00 00 GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

- A. Temporary Generator Sets
- B. Detailed Construction Phasing and transition plan; power outage schedule.

1.4 QUALITY ASSURANCE

- C. Safety: In addition to contract general conditions, comply with NESC and NFPA 70E for all work in and around electrical equipment.
- D. Installation Inspections Procedure: Generator startup and installation verification shall be performed by a qualified manufacturer's representative.
- E. Contractor shall provide a detailed written construction sequencing plan prior to the start of work. The sequencing plan included with the project drawings provides a minimum scope for bidding purposes. The detailed plan shall include a schedule of all work with special attention given to the transitions to/from temporary power.

- F. Contractor shall closely coordinate with RRWRD to ensure minimal impact to facility operations. Individual feeder temporary power cutovers shall be closely orchestrated and limited to no more than 1 hour of outage time.
- G. Contractor shall provide a positive means of communication, such as 2 way radios, for all personnel during power cutovers.
- H. Contractor shall provide (at a minimum) one primary, and two alternate phone numbers to contact in the case of a power failure during non-business ours. Failure of communications in the event of an outage is not the responsibility of RRWRD.

1.5 TEMPORARY POWER

A. Temporary Service - General Conditions and Requirements

1. Temporary Power

The contractor shall provide standby backup power to Aqua-Nereda Facility from the time that Transformer T-3 is removed until project completion. This timeframe shall be clearly included in the final phasing plan. The contractor shall closely coordinate, plan and schedule all outages and power cutovers with RRWRD Staff; all planned outages shall be no greater than 60 minutes. During the entire period of the contract, provide restoration of power within 30 minutes during regular business hours, and provide restoration of temporary power within 2 hours at night and on weekends.

For temporary three-phase power, the contractor will provide temporary diesel generation sets as shown on contract documents. Diesel power generation shall be rated for the type and size of load as well as the required continuous runtime to complete all work. Any electric power provided during the switchgear cutover shall be considered temporary power and subject to all requirements or conditions of RRWRD per contract documents.

2. Costs for Temporary Power

The contractor shall pay for the total labor for the installation and removal of all temporary facilities, plus any other costs associated with providing standby power, the total cost of any non-reusable materials, gear, and any fees prior to the installation of standby power.

3. Service

Connected and calculate demand load information is provided on contract documents. Contractor shall ensure standby power systems are sized for handling all motor inrush requirements for system start.

B. Temporary Service Cabling

- 1. All loads shall be wired with a copper equivalent to the existing feeder currently in service, unless the generator manufacturer specifies larger conductors due to load requirements.
- 2. Grounding of diesel power generation sets shall be in accordance with NEC and the manufacturer's requirements.
- 3. Temporary cables shall be of the length required to properly connect to the loads without binding.
- 4. Temporary cables shall be increased in size if required to account for voltage drop due to cable length.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PRELIMINARY TESTS AND INSPECTIONS

Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA and the manufacturer's recommendations. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Perform tests and inspections on applicable equipment and systems.

3.2 PLACING EQUIPMENT IN SERVICE

A representative of RRWRD shall be present when equipment is de-energized, initially energized and placed in service.

Not to be used for bidding purposes

AQUA NEREDA STANDBY POWER CHECKLIST

RRWRD SUBSTATION 3-6	Job Number	AQUA NEREDA FACILITY
PM	Foreman	QA/QC Inspector
Date	ID	One Line Sheet

ID	NOTES:	YES	NO	N/A	INITIALS
1	Generator installed and checked by manufacturer				
2	Grounding and Feeder Cables installed and run adjacent to MCC				
3	MCC Gear Open, phasing verified.				
4	Verify 2-way communications with RRWRD Staff				
5	Generator running with Main Breaker Open, phasing verified.				
6	Open Feeder Breaker to MCC in Power Center 2				
7	Open Main Breaker in MCC, verify MCC is de-energized				
8	Terminate Generator Feeder Cables in MCC				
10	Close Generator Feeder Breaker				
11	Verify phasing at MCC Main Breaker lugs				
12	Close MCC Main Breaker				
13	Verify that system controls and associated equipment are operational				

NOTES:

Wear appropriate Arc Flash suit and use proper equipment for working in live electrical gear.

END OF SECTION 26 09 00

SECTION 26 12 19 - LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.1 RELATED WORK AND REQUIREMENTS

- A. Section 26 05 13 – Medium Voltage Cables
- B. Section 26 05 33 – Raceway and Boxes for Electrical Systems

1.2 DESCRIPTION

- A. Provide 3-phase, liquid filled, compartmental type, pad-mounted transformers, including tap changers, fuses, and connection devices as specified herein and as indicated on the drawings.
- B. The transformer liquid shall be rated as less flammable.
- C. The transformer shall be Factory Mutual (FM) labeled.

1.3 QUALITY ASSURANCE

- A. The transformers shall be designed, manufactured, and tested in strict accordance with the latest revision of the following standards and codes:
 - 1. ANSI C57.12.28: Pad-Mounted Equipment - Enclosure Integrity.
 - 2. IEEE C57.12.00: General Requirements for Liquid – Immersed Distribution, Power and Regulating Transformers.
 - 3. IEEE C57.12.34 – Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 5MVA and Smaller; High Voltage, 34.5kV Nominal System Voltage and Below; Low Voltage, 15kV Nominal System Voltage & Below
 - 4. IEEE C57.12.90 – Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short Circuit Testing of Distribution and Power Transformers
 - 5. IEEE C57.121 – Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers
 - 6. IEEE 32 – Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices
 - 7. UL 340: Tests for Comparative Flammability of Liquids.
 - 8. OSHA
 - 9. Laws of the State

1.4 EQUIPMENT, MATERIALS AND SERVICES

- A. The transformer manufacturer shall furnish the transformers complete, fully assembled, and ready for installation by this Contractor.

- B. The Contractor shall furnish qualified personnel for receiving, installing, and starting up the transformers. Include in the base bid, eight hours of labor cost for time with the manufacturer's field engineer.
- C. Special maintenance tools, if required, shall be furnished.
- D. Transformers shall be of the manufacturer's latest design, sized and/or modified to meet the ratings and performance requirements specified herein.
- E. All other equipment and materials required for a complete and operable system as intended by this specification shall be furnished.

1.5 OPERATING CONDITIONS

- A. Normal Power (12.47kV Primary) transformers will be normally continuously energized and carrying load.
- B. Power flow through each transformer will be per the one-line. All transformers shall be "Step-Down" unless indicated on the drawings or within this specification as "Step-up". "Step-Up" designation shall indicate power flow from the LV winding to the HV winding. "Step-down" designation shall indicate power from the HV winding to the LV winding.

1.6 FACTORY TESTS

- A. Report of the following transformer tests shall be submitted for each transformer:
 - 1. Standard ANSI tests.
 - 2. Resistance measurements of windings on rated voltage tap of each transformer and at tap extremes of one transformer only of given rating on order.
 - 3. Ratio tests on rated voltage connections and on tap connections.
 - 4. Phase-relation and polarity tests on rated voltage connections.
 - 5. No load losses and excitation current at rated voltage on rated voltage connections.
 - 6. Impedance and load losses at rated current on rated voltage connections of each transformer and on extremes of one unit only of given rating on order.
 - 7. Applied and induced potential tests.
 - 8. Regulation and efficiency at rated load and voltage.
 - 9. Insulation resistance tests (high voltage to ground, low voltage to ground, high voltage to low voltage).
- B. Temperature test or tests shall be made on one unit only of transformers covered by these specifications of given rating, provided that test data is not available from records of temperature tests on duplicate or essentially duplicate transformer.

1.7 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data
- B. Shop Drawings

1.8 SUBMITTALS FOR RECORD ONLY

- A. Test Reports – Including manufacturer start-up reports.
- B. O&M Data

PART 2 PRODUCTS

2.1 TRANSFORMER RATINGS AND CHARACTERISTICS

A. Medium Voltage power transformers, as labeled on drawings, shall be rated as follows and have the following characteristics:

1.	T-3	
a.	kVA	2500 kVA
b.	Primary Voltage	12.47 kV delta, 95 kV BIL
c.	Secondary Voltage	480/277 V wye, 30kV BIL
d.	Cooling System	KNAN
e.	Operation	Step-down
f.	Installation	Outdoors

B. The dielectric coolant shall be listed, less-flammable fluid meeting the requirements of NEC 450-23 or non-flammable meeting NEC 450-24. The dielectric coolant shall be bio-based biodegradable electrical insulating and cooling liquid. The base fluid shall be 100% derived from edible seed oils. The performance enhancing additives shall be food grade. The fluid shall be certified to comply with the US EPA Environmental Technology Verification (ETV) requirements and tested for compatibility with transformer components. The fluid shall be Factory Mutual Approved and UL Classified, Envirotemp® FR3™ fluid.

C. Sound level shall be guaranteed by the manufacturer not to exceed values in Table 0-2 and Table 0-3 of NEMA standard TR 1-1993 (R200).

2.2 CONSTRUCTION

A. Transformers shall be:

- 1. Compartmental type, self-cooled, and tamper-resistant.
- 2. Sealed tank construction to withstand pressure of 15 psi.
- 3. Cover shall be bolted.

B. Transformer tank, high and low voltage compartments shall be assembled as integral unit.

C. High and low voltage compartments shall be located side by side separated by a steel barrier.

D. Cooling panels will be provided on back of tank.

E. High voltage compartment shall not be accessible until low voltage door has been opened.

- F. Low voltage door shall have 3-point latching mechanism with vault type handle having provisions for single padlock.
- G. Provide lifting eyes and jacking pads.
- H. Tank grounding provisions in each compartment.

2.3 FINISH

- A. Provide paint finish using Munsell 7.0 GY 3.29/1.5 (Bell Green) with total film thickness of 3.0 mil.

2.4 CORE AND COIL CONSTRUCTION

- A. Coils shall be wound with copper windings.
- B. Core shall be high grade, grain-oriented silicon steel laminations.
- C. Core and coil assembly shall be of wound core type 5-legged construction.
- D. Internal leads shall be insulated.
- E. Manual Tap Changer:
 - 1. Provide tap changer, externally operated.
 - 2. Tap changer handle shall have provisions for padlocking.
 - 3. Tap changer shall be 4-position with four 2-1/2% full capacity taps, 2 above and 2 below rated voltage.

2.5 MEDIUM VOLTAGE COMPARTMENTS (12.47kV)

- A. Terminations:
 - 1. Terminations shall be dead front construction.
 - 2. For transformers rated 4 MVA or less at 12.47kV, provide the following:
 - a. Universal 200A load break type bushing wells and parking stands for loop feed and mounting accessory equipment
 - b. Six (6) 200A load break bushing inserts for loop feed connections.
 - c. Bushings wells shall be externally clamped and externally removable.
 - 3. Provide elbow lightning arrestors as a removable item. Mount removable lightning arrestors on one side and phase conductor elbows on the other side of the dual insert as shown on drawings.
- B. High Voltage Switches, Fuses, and Overcurrent Protection:
 - a. For transformers rated 4MVA or less, provide two (2) two-position, sidewall mounted, load break, gang operated, oil immersed switches, with eye for hot stick operation. One for each set of 3-phase primary bushings.
 - b. Provide Cartridge Type weak link fuses; include 2 sets of spare fuses.

C. Lightning Arresters:

1. Provide three 18kV arresters installed in the high voltage compartment and grounded to structure. Connect to incoming load break bushings. Coordinate with one-line drawing (Manufacturer/Model/Ratings).
2. Metal-oxide varistor, Distribution Class
3. 15kV MCOV for 12.47kV system.

2.6 LOW VOLTAGE TERMINATIONS AND EQUIPMENT

- A. Bushings shall be molded epoxy.
- B. Externally clamped, blade type terminals with 10-hole NEMA spacing.
- C. Low voltage neutral bushing shall be fully insulated. Connect neutral pad to adjacent ground pad on tank with detachable strap.
- D. Provide mounting provisions for low voltage current transformers and potential transformers.

2.7 ACCESSORIES

- A. Each transformer shall be equipped with the following:
 1. Dial type thermometer for indication top liquid temperature.
 2. Globe valve to serve as drain valve, bottom filler plug connection, and liquid sampling valve with cover accessible outside of termination enclosure.
 3. Globe valve for top filter plug connection and vacuum pump connection.
 4. Pressure vacuum gauge.
 5. Magnetic liquid-level indicator.
 6. Spare fuse pocket with one complete set of spare fuses.
 7. Pressure relief device.
 8. IR windows of terminal connections.
 9. Stainless steel nameplate mounted in external compartment with the following information:
 - a. Serial number and style number.
 - b. Graphic representation of high voltage and low voltage connections, including polarity.
 - c. kVA ratings at all cooling class ratings and temperature rises.
 - d. Transformer impedance at 65°C base kVA rating.
 - e. Tap changer positions, voltages and full load currents at each tap setting.
 - f. Low voltage rating and full load current.
 - g. Gallons of liquid and type of liquid in tank and radiators.
 - h. Maximum allowable pressure on tank.
 - i. Transformer weight with and without oil.
 - j. Listing as non-PCB transformer.

2.8 NAMEPLATE/GAUGE COMPARTMENT

- A. Provide an external cabinet for viewing of the nameplate and status gauges. The cabinet shall be isolated from the LV and HV compartments, shall be accessible without opening the LV or HV compartments, and shall contain the following:
1. Top liquid temperature thermometer.
 2. Pressure vacuum gauge.
 3. Liquid-level indicator.
 4. Stainless steel nameplate as described in section 2.7, A.8.

2.9 LABELING

- A. Provide warning label on high voltage compartment door and danger label on inside low voltage compartment door.

2.10 HARDWARE

- A. Hardware including bolts, fasteners, caps, plugs, etc., shall be of corrosion resistant materials or plated with corrosion materials.

PART 3 EXECUTION

3.1 SHIPPING AND RECEIVING

- A. Manufacturer's sales representative shall be present upon delivery of the transformers to the jobsite to witness the examination of the impact indicators and the receiving inspection. The contractor and manufacturer's representative shall meet at the site to verify the pathways into the transformer's final installed location and establish a point of delivery for each unit.

3.2 INSTALLATION

- A. Install components as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Transformer must be installed level and plumb.
- C. Provide means for lifting complete transformer.
- D. Bearing surfaces of lifting means shall be free from sharp edges.
- E. Provide facilities for guying transformer.
- F. Provide lifting means for untanking transformer as required during installation.
- G. Base shall permit rolling (or sliding) in directions of both center lines of transformer and provision shall be made for pulling transformer in these directions.
- H. Locate jacking facilities near extreme ends of junction of base segments.

- I. Jack ports or lugs shall be so designed that lifting members of jack can be inserted.
- J. If liquid filling of any part of transformer is required at job site, supplier shall furnish liquid and job site supervision, and shall furnish or make available suitable filter press and vacuum pump.

3.3 INTERCONNECTION TO EXTERNAL EQUIPMENT

- A. Connect primary power cables at the primary bushing wells via bolt-on insulated rubber deadbreak elbows and ground shield wires to grounding pads as required.
- B. All connections shall be tightened with a torque wrench to bushing manufacturer's recommendations.

3.4 FIELD TESTING

- A. Transformer field-testing shall be performed in accordance with the manufacturer's recommendations.
- B. Additionally, for tests not covered by manufacturer's recommendations, perform the tests listed in the NETA Acceptance Testing Specifications – 2017, Section 7.2.2 – Transformers, Liquid-Filled.
- C. Perform specific inspections and mechanical tests as recommended by the manufacturer.

3.5 SECONDARY SYSTEM VERIFICATION

- A. The Contractor shall demonstrate that the secondary voltage phase rotation phase landings of each of the new transformers are identical. Typical phases shall be A.B.C, left-to-right.

END OF SECTION 26 12 19

Not to be used for bidding purposes

SECTION 26 23 00 - SWITCHGEAR

PART 1 GENERAL

Section 26 08 00 ELECTRICAL INSPECTION AND TESTING applies to this section, with the additions and modifications specified herein.

1.1 PRODUCT COORDINATION

Products and materials not considered to be switchgear and related accessories are specified in other Sections of Division 26.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- ASTM A123/A123M (2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM A240/A240M (2014) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- ASTM A653/A653M (2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- ASTM A780/A780M (2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- ASTM B187/B187M (2011) Standard Specification for Copper, Bus Bar, Rod and Shapes and General Purpose Rod, Bar and Shapes
- ASTM D149 (2009; R 2013) Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
- ASTM D1535 (2013) Specifying Color by the Munsell System
- ASTM D709 (2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- IEEE 81 (2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- IEEE C2 (2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

IEEE C37.13 (2008; INT 1 2009; AMD 1 2012) Standard for Low-Voltage AC Power
Circuit Breakers Used in Enclosures

IEEE C37.20.1 (2002; INT 1 2005; AMD A 2005; AMD B 2006; R 2007) Standard for
Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear

IEEE C37.90.1 (2012) Standard for Surge Withstand Capability (SWC) Tests for Relays
and Relay Systems Associated with Electric Power Apparatus

IEEE C57.12.01 (2005) General Requirements for Dry-Type Distribution and Power
Transformers Including Those with Solid-Cast and/or Resin-Encapsulated
Windings

IEEE C57.12.28 (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity

IEEE C57.12.29 (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity for
Coastal Environments

IEEE C57.13 (2008; INT 2009) Standard Requirements for Instrument Transformers

IEEE Stds Dictionary (2009) IEEE Standards Dictionary: Glossary of Terms &
Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS(2013) Standard for Acceptance Testing Specifications for Electrical Power
Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.1 (2008) Electric Meters Code for Electricity Metering

NEMA C12.4 (1984; R 2011) Registers - Mechanical Demand

NEMA ICS 6 (1993; R 2011) Enclosures

NEMA LI 1 (1998; R 2011) Industrial Laminating Thermosetting Products

NEMA/ANSI C12.10 (2011) Physical Aspects of Watthour Meters - Safety Standards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1558 (1999; Reprint Apr 2010) Metal-Enclosed Low-Voltage Power Circuit
Breaker Switchgear

UL 467 (2007) Grounding and Bonding Equipment

UL 489 (2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case
Switches, and Circuit-Breaker Enclosures

1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, use as defined in IEEE Stds Dictionary.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

- A. Shop Drawings
 - 1. Switchgear Drawings
- B. Product Data
 - 1. Switchgear
 - 2. Low Voltage Drawout Circuit Breaker
 - 3. Spare Parts List
- C. Test Reports
 - 1. Manufacturer Switchgear Design Tests
 - 2. Manufacturer Switchgear Production Tests
 - 3. Manufacturer Acceptance Checks and Tests
- D. Operation and Maintenance Data
 - 1. Switchgear Operation and Maintenance
- E. Closeout Submittals
 - 1. Warranty
 - 2. Assembled Operation and Maintenance Manuals
 - 3. Equipment Field Testing Report
 - 4. Manufacturer Test Report
 - 5. Switchboard Installation Checklist
 - 6. Infrared Scanning via FLIR Camera Software

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Switchgear Operation and Maintenance Data
 - 1. Submit operation and maintenance manuals in accordance with Section 01 33 00.
- B. Assembled Operation and Maintenance Manuals

1. Assemble and bind manuals securely in durable, hard covered, water resistant binders. Assemble and index the manuals in the following order with a table of contents. The contents of the assembled operation and maintenance manuals are as follows:
 - a. Manufacturer's O&M information required by the paragraph entitled, "Operation and Maintenance Data."
 - b. Catalog data required by the paragraph entitled, "Product Data".
 - c. Drawings required by the paragraph entitled, "Shop Drawings".
 - d. Spare parts and supply list.
 - e. Information on metering
 - f. Design test reports
 - g. Production test reports

C. Spare Parts List

1. Furnish a list of spare parts.

1.6 QUALITY CONTROL

A. Switchgear Product Data

1. Include on each submittal the manufacturer's information for each component, device and accessory provided with the switchgear including:
 - a. Circuit breaker type, interrupting rating, and trip devices, including available settings
Manufacturer's instruction manuals and published time-current curves (on full size logarithmic paper) of the main secondary breaker and largest secondary feeder device.

B. Switchgear Drawings

1. Drawings include, but are not limited to the following:
 - a. One-line diagram including breakers, current transformers, and meters
 - b. Outline drawings including front elevation, section views, footprint, and overall dimensions
 - c. Bus configuration including dimensions and ampere ratings of bus bars
 - d. Markings and NEMA nameplate data, including manufacturer's name, catalog number, and ratings
 - e. Circuit breaker type, interrupting rating, and trip devices, including available settings
 - f. Three-line diagrams and elementary diagrams and wiring diagrams with terminals identified, and indicating prewired interconnections between items of equipment and the interconnection between the items.
 - g. Manufacturer's instruction manuals and published time-current curves (on full size logarithmic paper) of the main secondary breaker and largest secondary feeder device.

C. Regulatory Requirements

1. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the city of Rockford. Ensure equipment, materials, installation, and workmanship are in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

D. Standard Products

1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Ensure products have been in satisfactory commercial or industrial use for 2-years prior to bid opening. The 2-year period includes applications of equipment and materials under similar circumstances and of similar size. Use products that have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, use products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.
2. Alternative Qualifications
 - a. Products having less than a two-year field service record are acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

E. Material and Equipment Manufacturing Date

1. Do not use products manufactured more than one-year prior to date of delivery to site, unless specified otherwise.

1.7 WARRANTY

Provide the Owner with warranties associated with the equipment. Ensure the equipment items are supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract. Warranty period shall cover two years from the date of substantial completion.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

Show wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items to ensure a coordinated installation.

A. Ratings

1. The voltage rating is 480Y/277 Volts, 4-wire 3 phase as indicated. The continuous current rating of the main bus is 3200 amperes as indicated. The short-circuit current rating is 100,000 rms symmetrical amperes. The switchgear is UL listed and labeled for its intended use.

B. Manufacturer: The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any submittals made are for products that meet or exceed the specifications included here.

1. Square D; Schneider Electric.
2. General Electric, G.E. Energy

2.2 COMPONENTS

Provide switchgear that conforms to IEEE/ASNI C37.20.1 and UL 1558.

A. Construction

1. Switchgear consists of vertical sections bolted together to form a rigid assembly and is front and rear aligned as indicated. All circuit breakers are front accessible. Ensure compartmentalized switchgear has vertical insulating or grounded steel barriers between the front device section, the main bus section, and the cable compartment with full front to rear vertical insulating or grounded steel barriers between adjacent sections. Where indicated, "space for future" or "space" means to include bus, device supports, and connections. Provide insulating or grounded steel barriers in accordance with NEMA LI 1, Type GPO-3, 0.25 inch minimum thickness. Provide a switchboard that is completely factory engineered and assembled, including protective devices and equipment indicated with necessary interconnections, instrumentation, and control wiring.

B. Enclosure

1. The switchgear enclosure is an outdoor NEMA ICS 6 Type 3R as indicated. Bolt enclosure together with removable bolt-on side and hinged rear covers, and sloping roof downward toward rear. Provide lockable doors with panic hardware. Provide keyed padlocks for each door of switchgear. M.Spinello & Son must perform the necessary work to key the locks. The contractor is not required to purchase hardware from M.Spinello & Son, but must consult with M.Spinello & Son to ensure proper style is purchased. The Contractor shall meet with RRWRD representative prior to having any work performed by M.Spinello & Son to receive final keying instructions. Ensure bases, frames and channels of enclosure are corrosion resistant and fabricated of galvanized steel. Base includes any part of enclosure that is within 3-inches of concrete pad. Galvaneal steel conforms to ASTM A123/A123M, ASTM A653/A653M G90 coating, and ASTM A153/A153M, as applicable. Galvanize after fabrication where practicable. Paint enclosure, including bases, ASTM D1535 gray ANSI No. 61 or ANSI No. 49. Paint coating system complies with IEEE C57.12.28 for galvanized steel.

C. Bus Bars

1. Bus bars shall be copper with silver-plated/finished surfaces. Rate the through-bus at the full ampacity of the main throughout the switchboard. Provide minimum one-quarter by 2-inch copper ground bus secured to each vertical section along the entire length of the switchgear. Rate the neutral bus 100 percent of the main bus continuous current rating.
2. All buses are copper and all bolted splices and connections between buses and for extensions or taps for equipment are silver-plated throughout. Copper bars and shapes for bus conductors conform to the applicable requirements of ASTM B187/B187M. Bolt all splices for field assembly with at least two bolts and employ the use of "Belleville" washers in the connection. Horizontal and vertical power buses have minimum current ratings as shown on the drawings. Insulate buses for not less than 600 volts. Braze, pressure-weld or bolt splices and tap connections. Bolt splices for field assembly. Mount the buses on insulating supports of wet process porcelain, glass polyester, or suitable molded material, and brace to withstand not less than 100,000 symmetrical amperes ac. Mount near the bottom of enclosure a copper ground bus, rated not less than 300 amps, extending the entire length of the assembled structure. Provide a full clamp-type solderless copper or copper alloy lug for a minimum No. 4/0 AWG stranded copper cable at each end of the bus for connection to the station grounding system.

D. Main Section

1. The main section consists of an individually mounted drawout Low-Voltage Power Circuit Breaker (LVPCB) and metering/control compartment with Schneider Electric ION7650 or GE EPM 9000 Power Quality Metering.

E. Distribution Sections

1. The distribution sections consist of drawout Low-Voltage Power Circuit Breakers and metering compartments as required.

F. Tie Section

1. Tie section consist consists of an individually mounted drawout Low-Voltage Power Circuit Breaker circuit breaker and metering/control compartment.

G. Handles

1. Ensure handles for individually mounted devices are of the same design and method of external operation. Label handles prominently to indicate device ampere rating, color coded for device type. Identify ON-OFF indication by handle position and by prominent marking.

H. Protective Device

1. Provide main and branch protective devices as indicated on one-line drawings.
2. Low Voltage Drawout Circuit Breakers
 - a. IEEE C37.13. manually operated drawout, low-voltage power circuit breaker with a short-circuit current rating of 100,000 rms amperes symmetrical as indicated at 480 volts. Breaker frame size is as indicated on one-line drawings
 - b. All breakers shall meet or exceed the ANSI total operations requirements (10,000 operations) without any interim maintenance. Breakers requiring interim maintenance to meet testing shall be acceptable, but provide one spare attic stock for each type included in the switchgear.
 - c. Equip drawout breakers with disconnecting contacts, wheels, and interlocks for drawout application. The main, auxiliary, and control disconnecting contacts are silver-plated, multifinger, positive pressure, self-aligning type. Provide each drawout breaker with four-position operation. Clearly identify each position by an indicator on the circuit breaker front panel.
 - (1) Connected Position: Primary and secondary contacts are fully engaged. Ensure breaker is tripped before racking into or out of position.
 - (2) Test Position: Primary contacts are disconnected but secondary contacts remain fully engaged. Position allows complete test and operation of the breaker without energizing the primary circuit.
 - (3) Disconnected Position: Primary and secondary contacts are disconnected.
 - (4) Withdrawn (Removed) Position: Places breaker completely out of compartment, ready for removal. Removal of the breaker actuates assembly that isolates the primary stabs.

3. Electronic Trip Units

- a. Conform to IEEE C37.90.1 for surge withstand. Provide true rms readings through the 63rd harmonic, plus/minus 0.5 percent accuracy, programmable, microprocessor-based meter enclosed in sealed cases with a high resolution graphic LED or LCD display. The meters accept input from standard 5A secondary instrument transformer and direct voltage monitoring range to 600 volts, phase to phase. Programming is via a front panel display and a communication interface with a computer. Password secured programming is stored in non-volatile EEPROM memory. Digital communications are Modbus protocol via a RS485 serial port. Ensure the meter calculates and stores average max/min demand values for all readings based on a user selectable sliding window averaging period. Ensure the meter has programmable hi/low set limits with two Form C dry contact relays when exceeding alarm conditions. Provide a meter with Total Harmonic Distortion (THD) measurement to the thirty-first order. Historical trend logging capability includes ability to store up to 100,000 data points with intervals of 1 second to 180 minutes. Have the unit also store and time stamp up to 100 programmable triggered conditions. Event waveform recording is triggered by transients as short as 17ms. Store waveforms for all 6 channels of voltage and current for a minimum of 10 cycles prior to the event and 50 cycles past the event.
2. Equipment main, tie and distribution breakers with a solid-state tripping system consisting of three current sensors and a microprocessor-based trip unit that provides true rms sensing adjustable time-current circuit protection. The ampere rating of the current sensors are as the same as the breaker frame rating. The trip unit ampere rating is as indicated on one-line drawings. Provide Ground fault protection with a modified differential ground fault protection scheme on Main and Tie Breakers; Provide the electronic trip units with the following features.
 - b. All Breakers have long delay pick-up and time settings, and LED indication of cause of circuit breaker trip.
 - c. Main and Tie breakers also have short delay pick-up and time settings, instantaneous settings and ground fault settings.
 - d. Distribution breakers also have short delay pick-up and time settings, instantaneous settings, and ground fault alarm.
 - e. All Breakers have a digital display for: instantaneous, average and maximum phase and ground current; demand and max demand currents per phase and ground; instantaneous, average, and maximum voltage unbalance between all phases and between phase and neutral; power factor; directional active, reactive, and apparent power including maximum and total for each. Meter simultaneously displays a selected phase to neutral voltage, phase to phase voltage, percent phase to neutral voltage THD, percent phase to phase voltage THD; a selected phase current, neutral current, percent phase current THD, percent neutral current; selected total PF, kW, KVA, kVAR, FREQ, kVAh, kWh. Detected alarm conditions include over/under current, over/under voltage, over/under KVA, over/under frequency, over/under selected PF/kVAR, voltage phase reversal, voltage imbalance, reverse power, over percent THD. Ensure the meter has a Form C KYZ pulse output relay.
 - f. Power Meter: Meter simultaneously displays Watts, VARs, and selected KVA/PF. Detected alarm conditions include over/under KVA, over/under PF, over/under VARs, over/under reverse power.
 - g. Volt Meter: Meter is selectable between simultaneous display of the three phases of phase to neutral voltages and simultaneous display of the three phases of the phase to phase voltages. Detected alarm conditions include over/under voltage, over/under voltage imbalance, over percent THD.
 - h. Ammeter: Meter simultaneously displays phase A, B, and C currents. Detected alarm conditions include over/under current, over percent THD.
 - i. Digital Watthour Meter: Meter has a single selectable display for watts, total kilowatt hours (kWh) and watt demand (Wd). The meter has a Form C KYZ pulse output relay.

- j. Power quality metering shall be provided at all breakers per 2.2.A.3.
 - k. All Breakers have provisions for communication via a network twisted pair cable for remote monitoring and metering.
 - l. All trip unit communications to be daisy chained Modbus TCP/IP to Ethernet gateway at respective main meter.
- I. Electrical Power Monitoring System
- 1. Provide microprocessor-based devices designed to monitor and display parameters of the circuit breaker electronic trip units that integrate into the existing EPMS. Provide the gateway to the existing EPMS in compartment 8. Provide a 120V receptacle in the gateway compartment to power the customer furnished fiber optic transceiver. Ensure the device provides the following minimum features:
 - a. Alphanumeric display.
 - b. Indication of circuit breaker status; tripped, open, closed.
 - c. Cause of circuit breaker trip.
 - d. Phase, neutral, and ground current for each breaker.
 - e. Energy and Harmonics parameters for each breaker.
 - f. Provisions for communicating directly to a remote computer via Ethernet.
- J. Current Transformers
- 1. IEEE C57.13. Ensure transformers are single ratio, 60 hertz, 3200 to 5-ampere ratio, 3200 rating factor, with a metering accuracy class of 0.3 through 3200.
- K. Control Power Transformer
- 1. Provide control transformers in switchgear in accordance with UL 1558 and as indicated. Ensure the transformer and sections are suitable for the installation.
- L. Meter Fusing
- 1. Provide a fuse block mounted in the metering compartment containing one fuse per phase to protect the voltage input to voltage sensing meters. Size fuses as recommended by the meter manufacturer.
- M. Heaters
- 1. Provide 120-volt heaters in each switchgear section. Provide heaters of sufficient capacity to control moisture condensation in the section, are 250 watts minimum, and controlled by a thermostat and humidistat located in the section. Provide an industrial type, high limit, thermostat to maintain sections within the range of 60 to 90 degrees F. Humidistat has a range of 30 to 60 percent relative humidity. Obtain supply voltage for the heaters from a control power transformer within the switchgear. If heater voltage is different than switchboard voltage, provide transformer rated to carry 125 percent of heater full load rating. Ensure transformer has 220 degrees C insulation system with a temperature rise not exceeding 115 degrees C and conforms to IEEE C57.12.01. Energize electric heaters in switchboard assemblies while the equipment is in storage or in place prior to being placed in service.
- N. Lighting: The enclosure shall come pre-wired with LED lighting and a 3-way switch at each door. Lighting shall be powered from the Control Power Transformer.

O. Terminal Boards

1. Provide with engraved plastic terminal strips and screw type terminals for external wiring between components and for internal wiring between removable assemblies. Terminal boards associated with current transformers are short-circuiting type. Terminate conductors for current transformers with ring-tongue lugs. Ensure terminal board identification is identical in similar units. Color code external wiring consistently for similar terminal boards.

P. Wire Marking

1. Mark control and metering conductors at each end. Provide factory-installed, white, plastic tubing, heat stamped with black block type letters on factory-installed wiring. On field-installed wiring, provide white, preprinted, polyvinyl chloride (PVC) sleeves, heat stamped with black block type letters. Each sleeve contains a single letter or number, is elliptically shaped to securely grip the wire, and keyed in such a manner to ensure alignment with adjacent sleeves. Provide specific wire markings using the appropriate combination of individual sleeves. Each wire marker indicates the device or equipment, including specific terminal number to which the remote end of the wire is attached.

Q. Manufacturer's Nameplate

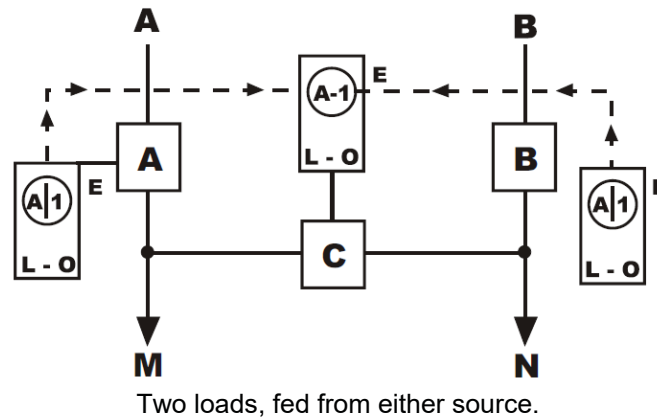
1. Ensure each item of equipment has a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable. This nameplate and method of attachment may be the manufacturer's standard if it contains the required information.

R. Field Fabricated Nameplates

1. ASTM D709. Provide laminated plastic nameplates for each switchgear, equipment enclosure, breaker, and device; as specified in this section or as indicated on the drawings. Ensure each nameplate inscription identifies the function and, when applicable, the position. Construct nameplates of melamine plastic, 0.125 inch thick, black with white center core. Accurately align lettering and engrave into the core. Minimum size of nameplates is 1 by 2.5-inches. Provide lettering with a minimum of 0.25-inch high normal block style.

S. Key Interlock Scheme

1. Provide KIRK® MD Series key interlocks for applications requiring a simple, heavy-duty, shaft driven design has no openings and few moving parts. The interlock shall withstand dirt and debris that could impede normal operation of a pin tumbler lock cylinder. The lock housings shall be brass, while the keys, cylinders, lock bolts and inner workings of the interlocks shall be 316 stainless steel. Design shall prevent key duplication or unauthorized mastering.
2. Provide a Main Tie Main Kirk Key Interlocking Scheme 13 on Mains and Tie Breakers to prevent paralleling of lines A and B as shown in the graphic below.



3. Breaker A is closed to supply load M. Breaker B is closed to supply load N. Tie-breaker C is open. Keys A-1 are held in interlocks on both breakers A and B. Tie-breaker C cannot be closed unless either A or B is locked open.
 - a. To transfer load N to breaker A:
 - (1) Open breaker B
 - (2) Turn key A-1 in L-O interlock on breaker B to lock open. Key A-1 is now free.
 - (3) Insert key A-1 in L-O interlock on tie-breaker C and turn to unlock. Key A-1 is now held.
 - (4) Close tie-breaker C.
 - (5) Reverse sequence to restore service.
 - (6) Load M can be supplied through breaker B in a similar manner.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Equipment Test Schedule

1. The Owner reserves the right to witness factory tests; any cost associated with travel to/from the factory, or lodging is at the expense of the owner. Provide equipment test schedules for tests to be performed at the manufacturer's test facility. Submit required test schedule and location, and notify the Owner 30 calendar days before scheduled test date. Notify Owner 15 calendar days in advance of changes to scheduled date.
2. Test Instrument Calibration Requirements
 - a. The manufacturer has a calibration program which assures that all applicable test instruments are maintained within rated accuracy.
 - b. The accuracy is directly traceable to the National Institute of Standards and Technology.
 - c. Instrument calibration frequency schedule cannot exceed 12 months for both test floor instruments and leased specialty equipment.
 - d. Dated calibration labels are visible on all test equipment.
 - e. Calibrating standard is of higher accuracy than that of the instrument tested.
 - f. Keep up-to-date records that indicate dates and test results of instruments calibrated or tested. For instruments calibrated by the manufacturer on a routine basis, in lieu of third party calibration, include the following:
 - 1) Maintain up-to-date instrument calibration instructions and procedures for each test instrument.
 - 2) Identify the third party/laboratory calibrated instrument to verify that calibrating standard is met.

B. Switchgear Design Tests

1. IEEE C37.20.1 and UL 1558.
2. Furnish documentation showing the results of design tests on a product of the same series and rating as that provided by this specification.
 - a. Short-circuit current test
 - b. Enclosure tests
 - c. Dielectric test

C. Additional design tests

1. In addition to normal design tests, perform the following tests on the actual equipment. Furnish reports which include results of design tests performed on the actual equipment.
 - a. Temperature rise tests
 - b. Continuous current

D. Switchgear Production Tests

1. IEEE C37.20.1 and UL 1558. Furnish reports which include results of production tests performed on the actual equipment for this project. These tests include:
 - a. 60-hertz dielectric tests
 - b. Mechanical operation tests
 - c. Electrical operation and control wiring tests
 - d. Ground fault sensing equipment test
 - e. Complete Modbus loop scan on all switch gear, verify all Modbus addresses in switch gear, document same and ship with gear to job site.

2.4 COORDINATED POWER SYSTEM PROTECTION

A power system study is being performed by the design engineer and is not required by the manufacturer. The contractor will provide input to the engineer for verification of as-built conditions.

PART 3 EXECUTION

3.1 INSTALLATION

Ensure electrical installations conform to IEEE C2, NFPA 70, and to the requirements specified herein

A. Grounding

1. NFPA 70 and IEEE C2, except that grounds and grounding systems have a resistance to solid earth ground not exceeding 5 ohms.
2. Grounding Electrodes
 - a. Provide driven ground rods as specified in Section 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL DISTRIBUTION. Connect ground conductors to the upper end of the ground rods by exothermic weld or compression connector. Provide compression connectors at equipment end of ground conductors.

3. Equipment Grounding

- a. Provide bare copper cable not smaller than No. 4/0 AWG not less than 24-inches below grade connecting to the indicated ground rods. When work in addition to that indicated or specified is directed to obtain the specified ground resistance, the provision of the contract covering "Changes" apply.

4. Connections

- a. Make joints in grounding conductors and loops by exothermic weld or compression connector. Install exothermic welds and compression connectors as specified in Section SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS, paragraph 3.3, "INSTALLATION."

5. Grounding and Bonding Equipment – Comply with UL 467, except as indicated or specified otherwise.

B. Installation of Equipment and Assemblies

1. Install and connect equipment furnished under this section as indicated on project drawings, the approved shop drawings, and as specified herein.

C. Switchgear

1. Comply with IEEE C37-20.1.

D. Meters and Instrument Transformers

1. Comply with ANSI C12.1.

E. Field Applied Painting

1. Where field painting of enclosures is required to correct damage to the manufacturer's factory applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

F. Galvanizing Repair

1. Repair damage to galvanized coatings using ASTM A780/A780M, zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces that repair paint has been applied to.

G. Field Fabricated Nameplate Mounting

1. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

H. Foundation For Equipment And Assemblies

1. Exterior Location

- a. Mount switchgear on concrete slab. The slab is at least 8-inches thick, reinforced with a 6 by 6-inch No. 6 mesh placed uniformly 4-inches from the top of the slab. Place slab on a well-compacted base. The top of the concrete slab shall be approximately 4-inches above the finished grade. Edges above grade have 1/2-inch chamfer. Ensure the slab is of adequate size to project at least 8-inches beyond the equipment. Provide conduit

turnups and cable entrance space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Cut off and bush conduits 3-inches above slab surface.

3.2 FIELD QUALITY CONTROL

A. Submit request for settings of breakers to the Engineer after approval of switchgear and at least 30 days in advance of their requirement. Provide all final feeder cable lengths, sizes, and final breaker types at the time of request.

B. Performance of Acceptance Checks and Tests

1. Perform tests in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

2. Switchgear (by Contractor)

a. Visual and Mechanical Inspection

- 1) Compare equipment nameplate data with specifications and approved shop drawings.
- 2) Inspect physical, electrical, and mechanical condition.
- 3) Confirm correct application of manufacturer's recommended lubricants.
- 4) Verify appropriate anchorage, required area clearances, and correct alignment.
- 5) Inspect all doors, panels, and sections for paint, dents, scratches, fit, and missing hardware.
- 6) Verify that circuit breaker sizes and types correspond to approved shop drawings.
- 7) Verify that current transformer ratios correspond to approved shop drawings.
- 8) Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.

a. Perform the following infrared scan tests and inspections and prepare reports:

- 1) Initial Infrared Scanning: After cutover and prior to Final Acceptance: Perform an additional follow-up infrared scan of the switchboard while under connected load. Remove front panels so joints and connections are accessible to portable scanner. Perform an infrared scan of each switchboard breaker connection under load.
- 2) Follow-up Infrared Scanning: 6 Months after final acceptance: Perform an additional follow-up infrared scan of the switchboard while under connected load. Remove front panels so joints and connections are accessible to portable scanner.
- 3) Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device. Correct any identified connections that indicate inadequate or improper termination.

2. Switchgear (by Manufacturer)

- 1) Confirm correct operation and sequencing of electrical and mechanical interlock systems.
- 2) Clean switchgear.
- 3) Inspect insulators for evidence of physical damage or contaminated surfaces.
- 4) Verify correct barrier installation and operation.
- 5) Exercise all active components.
- 6) Inspect all mechanical indicating devices for correct operation.

- 7) Verify that vents are clear.
- 8) Test operation, alignment, and penetration of instrument transformer withdrawal disconnects.
- 9) Inspect control power transformers.
3. Electrical Tests (by Contractor)
 - 1) Perform insulation-resistance tests on each bus section.
 - 2) Perform overpotential tests.
 - 3) Perform insulation-resistance test on control wiring; do not perform this test on wiring connected to solid-state components.
 - 4) Perform control wiring performance test.
 - 5) Perform primary current injection tests on the entire current circuit in each section of assembly.
 - 6) Perform phasing check on double-ended switchgear to ensure correct bus phasing from each source.
 - 7) Verify operation of switchgear heaters.
4. Low Voltage Power Circuit Breakers (by Contractor)
 - a. Visual and Mechanical Inspection
 - 1) Compare nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Confirm correct application of manufacturer's recommended lubricants.
 - 4) Inspect anchorage, alignment, and grounding. Inspect arc chutes. Inspect moving and stationary contacts for condition, wear, and alignment.
 - 5) Verify that all maintenance devices are available for servicing and operating the breaker.
 - 6) Verify that primary and secondary contact wipe and other dimensions vital to satisfactory operation of the breaker are correct.
 - 7) Perform all mechanical operator and contact alignment tests on both the breaker and its operating mechanism.
 - 8) Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.
 - 9) Verify cell fit and element alignment.
 - 10) Verify racking mechanism.
 - b. Electrical Tests (by Manufacturer)
 - 1) Perform contact-resistance tests on each breaker.
 - 2) Perform insulation-resistance tests.
 - 3) Adjust Breaker(s) for final settings in accordance with Engineer provided settings.
 - 4) Activate auxiliary protective devices, such as ground-fault or undervoltage relays, to ensure operation of shunt trip devices;
 - 5) Verify correct operation of any auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, and antipump function.
 - 6) Verify operation of charging mechanism.
5. Current Transformers (by Contractor)
 - a. Visual and Mechanical Inspection

- 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Verify correct connection.
 - 4) Verify that adequate clearances exist between primary and secondary circuit.
 - 5) Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey.
 - 6) Verify that all required grounding and shorting connections provide good contact.
- b. Electrical Tests (by Manufacturer)
- 1) Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.
 - 2) Perform insulation-resistance tests.
 - 3) Perform polarity tests.
 - 4) Perform ratio-verification tests.
6. Metering and Instrumentation (by Contractor)
- a. Visual and Mechanical Inspection
- 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Verify tightness of electrical connections.
- b. Electrical Tests (by Manufacturer)
- 1) Determine accuracy of meters at 25, 50, 75, and 100 percent of full scale.
 - 2) Calibrate watt-hour meters according to manufacturer's published data.
 - 3) Verify all instrument multipliers.
 - 4) Electrically confirm that current transformer and voltage transformer secondary circuits are intact.
 - 5) Verify all software installation and setup.
7. Grounding System (by Contractor)
- a. Visual and Mechanical Inspection
- 1) Inspect ground system for compliance with contract plans and specifications.
- b. Electrical Tests (by Contractor)
- 1) IEEE 81. Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. Ensure the instrument is equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

- 2) Submit the measured ground resistance of each ground rod and grounding system, indicating the location of the rod and grounding system. Include the test method and test setup (i.e., pin location) used to determine ground resistance and soil conditions at the time the measurements were made.

C. Follow-Up Verification

1. Upon completion of acceptance checks, settings, and tests, show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. Trip circuit breakers by operation of each protective device. Testing requires each item to perform its function not less than three times. As an exception to requirements stated elsewhere in the contract, give the Owner 5 working days advance notice of the dates and times for checks, settings, and tests.

END OF SECTION 26 23 00

Not to be used for bidding purposes

Not to be used for bidding purposes

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Distribution panelboards.
 2. Disconnecting Devices.

1.2 DEFINITIONS

- A. MCCB: Molded-case circuit breaker.
- B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
- B. Shop Drawings: For each panelboard and related equipment.
1. Include dimensioned plans, elevations, sections, and details.
 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 3. Detail bus configuration, current, and voltage ratings.
 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 5. Include evidence of NRTL listing for series rating of installed devices.
 6. Include evidence of NRTL listing for SPD as installed in panelboard.
 7. Include wiring diagrams for power, signal, and control wiring.
 8. Key interlock scheme drawing and sequence of operations.
 9. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

- A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 FIELD CONDITIONS

- A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
1. Panelboard Warranty Period: 24 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.
- D. Enclosures: Surface-mounted, dead-front cabinets.
1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Wash-Down Areas: NEMA 250, Type 4X stainless steel.
 - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - e. Grit Rooms, and all areas other than electrical room and outdoors: Class I, Division I rated.
 2. Height: 84 inches maximum.
 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- E. Incoming Mains Location: Top or Bottom as required.
- F. Phase, Neutral, and Ground Buses: Silver Plated Hard-drawn copper, 98 percent conductivity.
- G. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
- H. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- I. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.
- J. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

- A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.3 POWER PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Square D.
 - 2. General Electric Company.
- B. Panelboards: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 - 1. For doors more than 36 inches high, provide two latches, keyed alike. Coordinate keys with RRWRD Plant Operation.
- D. Mains: Circuit breaker.
- E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Square D
 - 2. General Electric Company.
- B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic Trip Circuit Breakers:

- a. RMS sensing.
 - b. Field-replaceable rating plug or electronic trip.
 - c. Digital display of settings, trip targets, and indicated metering displays.
 - d. Multi-button keypad to access programmable functions and monitored data.
 - e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
 - f. Integral test jack for connection to portable test set or laptop computer.
 - g. Field-Adjustable Settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long and short time adjustments.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
 6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
 7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 8. Subfeed Circuit Breakers: Vertically mounted.
 9. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
- C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
 1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 262813 "Fuses."

2.5 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

2.6 ACCESSORY COMPONENTS AND FEATURES

- A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install panelboards and accessories according to NECA 407 and NEMA PB 1.1.
- C. Mount top of trim no more than 80 inches above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box.
- E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- H. Install filler plates in unused spaces.
- I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 24 16

Not to be used for bidding purposes

SECTION 26 28 13 - FUSES

PART 1 GENERAL

1.1 **SUMMARY**

A. Section Includes:

1. Medium Voltage fuses rated 15kV ac and less for use in enclosed switchgear.

1.2 **COORDINATION**

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.3 **SUBMITTALS FOR REVIEW/RECORD**

A. Product Data: Include the following for each fuse type indicated:

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Ambient temperature adjustment information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse ratings, local ambient temperature, and adjusted fuse ratings.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

1.4 **EXTRA MATERIALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One set (3) of each size and type.

PART 2 PRODUCTS

2.1 **MEDIUM VOLTAGE FUSES**

- A. Fuses shall be current limiting type of self-contained design to limit available fault current stresses on the system and shall have interrupting capacity of 50,000 amperes symmetrical rms.
- B. Comply with ANSI C37.46, IEC 549 and IEEE C37.48 Standards.
- C. Characteristics: Nonrenewable clip lock fuses with 15.5kV voltage rating. Fuses shall include blown fuse indicator window.
- D. Provide UL Listed products equal to Ferraz-Shawmut (Mersen) Amp-Trap CL-14 Series E-Rated fuses; field verify dimensions in existing Medium Voltage Switchgear prior to ordering.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment as designated on design documents.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings. Adjustment factors to be applied per manufacturer recommendations.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Medium Voltage Fuses:
 - 1. E-Rated, General Purpose for Transformer Protection.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 26 05 53 – “Identification for Electrical Systems” and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket and holder.

END OF SECTION 26 28 13

SECTION 26 36 00 - TRANSFER SWITCHES

PART 1 GENERAL

1.1 SUMMARY

- A. The Section includes automatic transfer switches rated 600 V and less.
- B. Furnish and install automatic transfer switches with number of poles, amperage, voltage, withstand and close-on ratings as shown on plans. Each automatic transfer switch shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. Power transfer switch mechanism and microprocessor controller integration shall be a product of the same manufacturer, per automatic transfer switch show on the project drawings.

1.2 REFERENCE STANDARDS

- A. IEEE472 (ANSI C37.90A) Ring Wave Test.
- B. ENC55011 1991 Class A Conducted and Radiated Emission.
- C. EN61000-4-2 Electrostatic Discharge Immunity, Direct Contact & Air Discharge.
- D. EN61000-4-3 Radiated Electromagnetic Field Immunity.
- E. EN61000-4-4 Electrical Fast Transient Immunity.
- F. EN61000-4-5 Surge Immunity.
- G. ENV50141 HF Conducted Disturbances Immunity.

1.3 TESTS AND CERTIFICATIONS

- A. Automatic transfer switches shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and compliance with withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

1.4 WARRANTY

- A. Equipment furnished under this specification section shall be guaranteed against defective parts and workmanship under terms of the manufacturer's standard warranty. Minimum warranty period

shall be two years from date of substantial completion and shall include labor and travel time for necessary repairs at the job site.

1.5 SUBMITTALS FOR REVIEW/RECORD

A. Product Data

1.6 SUBMITTALS FOR RECORD ONLY

A. Test Reports: See Project Specification Section # 26 91 00

1. Manufacturer Start-Up Reports
2. ATS Installation Checklist

B. O&M Data

PART 2 PRODUCTS

2.1 TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Manufacturer: The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any submittals made are for products that meet or exceed the specifications included here.
- A. Emerson ASCO
- B. The transfer switches shall be the double throw, dual operator type and electrically operated and mechanically held. The transfer switches shall be either closed or open transition (refer to plans). If labeled as open transition, the switch shall be mechanically interlocked to ensure only two possible positions, primary or alternate power source.
- C. All transfer switch sizes shall use the same type of main operator for ease of maintenance and commonality of parts.
- D. Transfer switch shall operate in Manual mode with Automatic capability (all automatic transfer logic will be disabled at startup).
- E. Provide maintenance bypass operation.
- F. The switches shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
- G. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.
- H. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.

- I. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, are not acceptable.
- J. Where neutral conductors must be switched as shown on the plans, the ATS shall be 4-pole with a switched neutral pole. The neutral pole shall be the same construction and have the same ratings as the phase poles. All poles shall be switched simultaneously using a common crossbar.

2.2 MICROPROCESSOR CONTROLLER

- A. The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through a serial communication module.
- B. A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to +1% of nominal voltage. Frequency sensing shall be accurate to + 0.2%. The panel shall be capable of operating over a temperature range of -20 to +60 degrees C and storage from 55 to +85 degrees C.
- C. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The protective cover shall include a built-in pocket for storage of the operator's manuals
- D. All customer connections shall be wired to a common terminal block to simplify field-wiring connections.
- E. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as identified by Reference Standards noted above (1.2).
- F. Information to be monitored and/or controlled through the microprocessor based controller shall include, but not be limited to:
 - A. Monitors availability of primary power source (appropriate voltage and frequency).
 - B. Monitors availability of alternate power source (appropriate voltage and frequency).
 - C. Sends output signals to the remote communication box signaling a loss of primary power.
 - D. Digital Display and Keypad. A four line, 20 character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port.

2.3 ENCLOSURE

- A. The automatic transfer switches shall be furnished in NEMA type 4X enclosures.
- B. All door-mounted switches and pilot lights shall be 16-mm industrial grade type or equivalent for easy viewing & replacement.
- C. All transfer switches shall be front accessible only. Rear and side access shall not be required.

2.4 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING

- A. Voltage and frequency on both the primary and alternate sources (as noted below) shall be continuously monitored, with the following pickup, dropout and trip setting capabilities (values shown as % of nominal unless otherwise specified):

<u>Parameter</u>	<u>Sources</u>	<u>Dropout / Trip</u>	<u>Pickup / Reset</u>
Undervoltage	N&A, 3φ	70 to 98%	85 to 100%
Overvoltage	N&A, 3φ	102 to 115%	2% below trip
Underfrequency	N&A	85 to 98%	90 to 100%
Overfrequency	N&A	102 to 110%	2% below trip
Voltage Unbalance	N&A	5 to 20%	1% below dropout

N=Normal, A=Alternate

- B. Repetitive accuracy of all settings shall be within + 0.5% over an operating temperature range of 20°C to 60°C.
- C. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.
- D. The controller shall be capable (when activated by the keypad or through the serial port) of sensing the phase rotation of both the primary and alternate sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).
- E. Source status screens shall be provided for both primary & alternate to provide digital readout of voltage on all 3 phases, frequency, and phase rotation.

2.5 TIME DELAY

- A. An adjustable time delay of 0 to 120 seconds shall be provided to override momentary primary source outages and delay all transfer signals.
- B. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:
- A. Prior to transfer only.
 - B. Prior to and after transfer.
 - C. Primary to alternate only.
 - D. Alternate to primary only.
 - E. Primary to alternate and alternate to primary.
 - F. All transfer conditions or only when both sources are available.
- C. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.

- D. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port.

2.6 ADDITIONAL FEATURES

- A. A three position momentary-type test switch shall be provided for the test / automatic / reset modes. The test position will simulate a primary source failure. The reset position shall bypass the time delays on either transfer to alternate or retransfer to primary. Test switch shall be key operated.
- B. A set of DPDT gold-flashed contacts rated 10 amps, 32 VDC shall be provided for a low-voltage engine start signal.
- C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of two contacts, closed when the ATS is connected to the primary source and two contacts closed, when the ATS is connected to the alternate source.
- D. LED indicating lights (16 mm industrial grade, type 12) shall be provided; one to indicate when the ATS is connected to the primary source (green) and one to indicate when the ATS is connected to the alternate source (red).
- E. LED indicating lights (16 mm industrial grade, type 12) shall be provided and energized by controller outputs. The lights shall provide true source availability of the primary and alternate sources, as determined by the voltage sensing trip and reset settings for each source.
- F. Provide the ability to select "commit/no commit to transfer" to determine whether the load should be transferred to the alternate if the primary source restores before it is ready to accept the load.
- G. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to alternate and for remote contacts which open to inhibit retransfer to primary ("re-transfer inhibit"). Both of these inhibit signals can be activated through the keypad or serial port.
- H. System Status - The controller LCD display shall include a "System Status" screen which shall be readily accessible from any point in the menu by depressing the "ESC" key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example,
 - A. Primary Failed
 - B. Load on Primary
 - C. Time Delay (TD) Primary to Alternate
 - D. 2min15s
- I. Controllers that require multiple screens to determine system status or display "coded" system status messages, which must be explained by references in the operator's manual, are not permissible.
- J. Self-Diagnostics - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.
- K. Communications Interface The controller shall be capable of interfacing, through a serial communication module, with a network of transfer switches, locally (up to 4000 ft.) or remotely through modem serial communications. Standard software specific for transfer switch applications

shall be available by the transfer switch manufacturer. This software shall allow for the monitoring, control and setup of parameters.

- L. Data Logging - The controller shall have the ability to log data and to maintain the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:
 - A. Event Logging
 - a. Data and time and reason for transfer primary to alternate.
 - b. Data and time and reason for transfer alternate to primary.
 - c. Data and time and reason for engine start.
 - d. Data and time engine stopped.
 - e. Data and time alternate source available.
 - f. Data and time alternate source not available.
 - B. Statistical Data
 - a. Total number of transfers.
 - b. Total number of transfers due to source failure.
 - c. Total number of days controller is energized.
 - d. Total number of hours both primary and alternate sources are available.

2.7 WITHSTAND AND CLOSING RATING

- A. The transfer switches shall be rated to close on and withstand the available RMS symmetrical short circuit current at the transfer switch terminals with the type of overcurrent protection shown on the plans. Withstand rating shall be 35 KA at 480 volts unless otherwise indicated on drawings.
- B. The transfer switches shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 12 and 3 cycle long-time ratings. Transfer switches which are not tested and labeled with 12 and 3 cycle (any breaker) ratings and have series or specific breaker ratings only, are not acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install transfer switch assembly in accordance with manufacturer's written instructions and NEC.

3.2 TRANSFER SWITCH STARTUP

- A. Disable the two time delay modes on re-transfer to primary, this time delay function will be indefinite. Re-transfer to primary will be inhibited and will require an operator to manually transfer back to the primary source.
- B. Retain services of transfer switch manufacturer's factory trained technician to perform following services:
 - A. Program the ATS with the required delays and disabled features.
 - B. Demonstration
 - a. After all sources are electrically connected to automatic transfer switches, provide comprehensive demonstration of system maintenance and operation to Owner or Owner's maintenance personnel.

- b. Include minimum of six simulated power failures.
- C. Verify operation of remotely connected control wiring and interlocks.
- D. Provide a written record of the programming. Manufacturer to request form of programming record (paper/electronic) and number of copies from owner.

END OF SECTION 26 36 00

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SECTION 26 41 00 - LIGHTNING PROTECTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

- A. NFPA 70 - (2008) National Electrical Code
- B. NFPA 780 – (2014) Standard for the Installation of Lightning Protection Systems
- C. UL 467 - (2007) Grounding and Bonding Equipment
- D. UL 96 - (2005; Reprint Oct 2010) Standard for Lightning Protection Components
- E. UL 96A - (2007; Reprint Oct 2010) Standard for Installation Requirements for Lightning Protection Systems
- F. IEEE 81 - (2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

1.2 SYSTEM REQUIREMENTS

- A. System shall consist of a concealed copper Lightning Protection System. Materials shall consist of standard products of a manufacturer regularly engaged in production of lightning protection systems and manufacturer's latest UL approved design. Lightning protection system and materials shall conform to NFPA 70, NFPA 780, UL 96 and UL 96A.

1.3 QUALITY ASSURANCE

- A. Installation Drawings
 - 1. Submit installation drawings for the overall lightning protection system. Drawings shall include physical layout of the equipment, dimensions, mounting details, relationship to other parts of the work, and wiring diagram.
 - 2. Submit detail drawings for each major component to include manufacturer's descriptive and technical literature, catalog cuts, and installation instructions.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, and marked for intended use.

1.4 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data

1.5 SUBMITTALS FOR RECORD ONLY

- A. Test Reports: See Project Specification Section 26 91 00 and 26 08 00
 - 1. Measure Ground Resistance
 - 2. Grounding and Bonding Installation Checklist
- B. As-Built Drawings

PART 2 PRODUCTS

2.1 MATERIALS

- A. Do not use a combination of materials that forms an electrolytic couple of such nature that corrosion is accelerated in presence of moisture unless moisture is permanently excluded from the junction of such metals. Where unusual conditions exist which would cause corrosion of conductors, provide conductors with protective coatings. Where a mechanical hazard is involved, or protect conductors by covering them with molding or tubing made of wood or nonmagnetic material. When metallic conduit or tubing is provided, electrically bond conductor to conduit or tubing at the upper and lower ends by clamp type connectors or welds (including exothermic).
- B. Lightning protection equipment, Accessories, and Hardware shall conform to NFPA 70, NFPA 780, and UL 96.
- C. Main and Bonding Conductors: NFPA 780 and UL 96 - Size of conductors shall not be less than specified in NFPA 780.
- D. For structures not exceeding 75 ft in height, provide copper main conductors that do not weigh less than 187 pounds per thousand feet, have a cross section area of not less than and minimum strand size of not less than 17 AWG. Provide loop conductors that are comprised of copper conductors not smaller than No. 1/0 AWG.
- E. Do not allow aluminum to contact the earth and do not use in any other manner that will contribute to rapid deterioration of the metal. Observe appropriate precautions at connections with dissimilar metals in accordance with NFPA 70 Article 110-14.

2.2 COMPONENTS

A. Air Terminals

- 1. Provide terminals in accordance with UL 96. Support air terminals more than 24 inches in length by suitable brace, with guides, not less than one-half the height of the terminal.
- 2. Air terminals shall be 5/8-inch aluminum or 1/2-inch diameter nickel-tipped copper. Fasten air terminals to a bronze/aluminum connectors with a male threaded stud on which the female threaded air-terminal shaft shall be mounted
- 3. Air terminals shall be not less than 10-inches high above the object to protect, tapered to a point. Separate points are not required on top of air terminals, but if used, the points shall be of substantial construction and securely attached by screw or slip joints. Air terminals more than 24-inches high shall be supported by a suitable brace with guide(s) not less than one-half the height of the air terminal.

B. Ground Rods

- 1. Provide ground rods made of copper-clad steel, stainless steel, or solid copper conforming to UL 467. Contractor shall determine the soil resistance at the site; use galvanized ferrous rods conforming to ANSI C135.30 where low soil resistivity is encountered and use copper clad steel rods for normal soil resistance. Provide ground rods that are not less than 3/4 inch in diameter and 10 feet in length. Do not

mix ground rods of copper-clad steel, stainless steel, galvanized ferrous, or solid copper on the same job.

C. Connections and Terminations

1. Provide connectors for splicing conductors that conform to UL 96. Conductor connections can be made by clamps or welds (including exothermic). Provide style and size connectors required for the installation of corrosion-resistant material (bimetallic) affording protection against electrolysis when joining dissimilar metals.

D. Connector Fittings: Provide connector fittings for "end-to-end", "Tee", or "Y" splices that conform to NFPA 780.

E. Lightning Protection Components: Provide bonding plates, air terminal supports, chimney bands, clips, and fasteners that conform to UL 96 classes as applicable.

2.3 MAIN AND SECONDARY CONDUCTORS

- A. Concealed conductors shall be in accordance with NFPA 780 and UL 96 and shall be copper or aluminum.
- B. Weight of copper conductors shall be not less than 187.5 pounds per thousand feet, and the size of any wire of this cable shall be not less than AWG No. 17. Copper tube or solid-section conductors of copper shall weigh not less than 187.5 pounds per thousand feet, and no tube wall shall be less than AWG No. 20. Thickness of any copper ribbon or strip shall be not less than AWG No. 16.
- C. Do not allow aluminum to contact or touch the earth, dissimilar metals, or constructions where rapid deterioration of the metal could result. Observe precautions at connections with dissimilar metals.

2.4 CLAMP-TYPE CONNECTORS

- A. Clamp connectors for splicing conductors shall conform to UL 96 and CID A-A-59213, Class 2 noninsulated, style and size as required for the installation. Connectors shall be of corrosion-resistant material and shall afford protection against electrolysis.

2.5 LIGHTNING PROTECTION COMPONENTS

- A. Lightning protection components, such as bonding plates, air terminal supports, chimney bands, clips, and fasteners shall conform to UL 96, classes as applicable.

PART 3 EXECUTION

3.1 INTEGRAL SYSTEM

- A. Lightning protection system consists of air terminals, roof conductors, down conductors, ground connections, grounding electrodes and ground loop conductor. Electrically interconnect lightning protection system to form the shortest distance to ground. Do not use non-conducting parts of the structure as part of the building's lightning protection system. Expose conductors on the structures except where conductors are required to be in protective sleeves. Interconnect secondary conductors with grounded metallic parts within

the building. Make interconnections within side-flash distances at or above the level of the grounded metallic parts.

B. Air Terminals

1. Provide air terminal design and support conforming to NFPA 780. Rigidly connect terminals to, and make electrically continuous with, roof conductors by means of pressure connectors or crimped joints of T-shaped malleable metal. Provide pressure connector or crimped joint with a dowel or threaded fitting to connect ground rod conductor with air terminal. Set air terminals at ends of structures not more than 2 feet from ends of ridges and corners of roofs. Do not exceed 25 feet in spacing of 2 foot high or greater air terminals on ridges, parapets, and around perimeter of building with flat roofs or 20 feet in spacing of air terminals less than 2 feet high. When necessary to exceed this spacing, use taller air terminals and the rolling sphere method. On large flat, or gently sloping roofs, as defined in NFPA 780, place air terminals at points of the intersection of imaginary lines dividing the surface into rectangles having sides not exceeding 50 feet in length. Secure air terminals against overturning either by attachment to the object to be protected or by means of a substantial tripod or other braces which are permanently and rigidly attached to the building or structure. Metal projections, metal parts of buildings, and other metal objects that are at least 3/16 inch thick and that do not contain hazardous materials, need not be provided with air terminals. However, bond these metal objects to a lightning conductor through a metal conductor of the same unit weight per length as the main conductor. Where nonmetallic spires, steeples, or ventilators are present, mount air terminals to the side. In addition, where spires or steeples project more than 10 feet above the building, continue conductor from air terminal to nearest down conductor securely connect thereto.

C. Roof Conductors

1. Connect roof conductors directly to the roof or ridge roll. Avoid sharp bends or turns in conductors. Do not make turns of less than 8 inches radius. Preserve horizontal or downward course on conductors. Rigidly fasten conductors every 3 feet along the roof and down the building to the ground. Rigidly connect metal ventilators to the roof conductor at two places. Make connections electrically continuous. Course roof conductors along contours of flat roofs, ridges, parapets, and edges; and where necessary, over flat surfaces, in such a way as to join each air terminal to all the rest. Connect roof conductors surrounding tank tops, decks, flat surfaces, and flat roofs to form a closed loop.

D. Down Conductors

1. Make down conductors electrically continuous from air terminals and roof conductors to grounding electrodes. Course down conductors over outer extreme portions of the building, such as corners, with consideration given to location of ground connections and air terminals. Provide each building or structure not less than two down conductors located as widely separated as practicable, such as at diagonally opposite corners. Provide at least one additional down conductor for each 100 feet of perimeter or fraction thereof. Provide enough conductors so that the average distance between them along the perimeter is not greater than 100 feet. Structures exceeding 50 feet in height, provide at least one additional down conductor for each additional 60 feet of height or fraction thereof, except that this application will not cause down conductors to be placed about the perimeter of the structure at intervals of less than 50 feet. Install additional down conductors when necessary to avoid "dead ends" or branch conductors ending at air terminals, except where the air terminal is on a roof below the main protected level and the "dead end" or branch conductor is less than 16 feet in length and maintains a horizontal or downward coursing. Equally and symmetrically spaced down conductors about the

perimeter of the structure. Protect conductors where necessary, to prevent physical damage or displacement to the conductor. Protect down conductors by placing in PVC or RMC conduit for a minimum distance of 72 inch above finished grade level. If the conduit is metal, bond the down conductor at the top and bottom of the conduit.

E. Interconnection of Metallic Parts: Connect metal gutters directly to ground or down conductors using not smaller than No. 6 copper conductor, or equivalent.

F. Ground Connections

1. Securely connect conductor forming continuations of down conductors from structure to grounding electrode in a manner to ensure electrical continuity between the two. Provide clamp type connections or exothermic welds for continuation. Provide a ground connection for each down conductor. Attach down conductors to ground rods by welding (including exothermic), brazing, or clamping. Provide clamps suitable for direct burial. Protect ground connection from mechanical injury. Bond metal water pipes and other large underground metallic objects together with all grounding mediums. In making ground connections, take advantage of all permanently moist places where practicable, although avoid such places when area is wet with waste water that contains chemical substances, especially those corrosive to metal.

G. Grounding Electrodes

1. Provide grounding electrode for each down conductor. Extend driven ground rods into the existing undisturbed earth for a distance of not less 10 feet. Set ground rods not less than 3 feet nor more than 6 feet, from the structure. After the completed installation, measure the total resistance to ground using the fall-of-potential method described in IEEE 81. Maximum resistance of a driven ground rod shall be 10 ohms, under normally dry conditions and when a ground loop is not used.
2. Use a ground loop when two of any three ground rods, driven not less than 10 feet into the ground, a minimum of 10 feet apart, and equally spaced around the perimeter, have a combined resistance value exceeding 50 ohms immediately after having driven. For ground loop, provide continuous No. 1/0 bare stranded copper cable or equivalent material having suitable resistance to corrosion. Lay ground loop around the perimeter of the structure in a trench not less than 24 inches below grade, at a distance not less than feet nor more than 6 feet from the nearest point of the structure. Install a ground loop in earth undisturbed by excavation, not earth fill, and do not locate beneath roof overhang, or wholly under paved areas or roadways where rainfall cannot penetrate to keep soil moist in the vicinity of the cable. Make connections between ground conductors and grounds or ground loop, and between ground loop and grounds electrically continuous.

3.2 INTERFACE WITH OTHER STRUCTURES

A. Interconnection of Metal Bodies

1. Protect metal bodies of conductance if not within the zone of protection of an air terminal. All metal bodies of conductance having an area of 400 square inches or greater or a volume of 1000 cubic inches or greater shall be bonded to the lightning protection system using main size conductors and a bonding plate having a surface contact area of not less than 3 square inches. Metal bodies of inductance shall be bonded at their closest point to the lightning protection system using secondary bonding conductors and fittings. A metal body that exceeds 5 feet in any dimension, that is situated wholly within a building, and that does not at any point come within 6

feet of a lightning conductor or metal connected thereto shall be independently grounded.

B. Exterior Overhead Pipe Lines

1. Properly ground overhead pipes, conduits, and cable trays on the exterior of the building that enter a building, preferably to building grounds at points where pipes enter the building. Where a separate ground is provided, bond the pipes to the building ground at points where the pipes are closest to the ground connections. In addition, bond pipes to any metallic masses that are within 6 feet of the pipe.

3.3 RESTORATION

- A. Where sod has been removed, place sod as soon as possible after completing the backfilling. Restore to original condition the areas disturbed by trenching, storing of dirt, cable laying, and other work. Include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging or mulching in any restoration. Maintain disturbed surfaces and replacements until final acceptance.

3.4 FIELD QUALITY CONTROL

A. Grounding System Test

1. Test the grounding system to ensure continuity and that resistance to ground is not in excess of 10 ohms. Test the ground rod for resistance to ground before making connections to the rod. Tie the grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Include in the written report: locations of ground rods, the ground resistance, and the soil conditions at the time that measurements were made.

B. Lightning Protection System Inspection

1. Make visual inspections to verify that there are no loose connections which may result in high resistance joints, and that conductors and system components are securely fastened to their mounting surfaces and are protected against accidental mechanical displacement.

3.5 SYSTEM RATINGS

- A. Submit certificates showing compliance with UL requirements for "Master Label" ratings.
- B. Lightning-protection systems conforming to the installation requirements of UL 96A shall be qualified for a UL "Master Label" rating. Installed lightning-protection system shall be inspected and approved by a certified UL inspector.

END OF SECTION 26 41 00

SECTION 26 43 13 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 GENERAL

1.1 SUMMARY

- A. The Section includes SPDs for low-voltage power equipment.
- B. Provide a complete Surge Protection system as described herein and as documented on the Contract Documents.
- C. Provide surge suppression at each switchgear main, and at other locations as indicated on the Contract Drawings.
- D. Modes of Protection:
 - 1. SPD units shall provide Line to Line and Line to Ground.
 - 2. "Per Phase" ratings are determined by multiplying the kA per mode times the number of discrete modes of protection (directly connected mov's), minus the value for the Neutral to ground mode, divided by the number of phases.
 - 3. Per Phase = (kA per mode minus the N-G mode) X (# of modes) / # of phases.

1.2 COORDINATION

- A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

1.3 WARRANTY

- A. The manufacturer shall provide unlimited free replacement of the entire SPD (not just modules, components or sub-assemblies) for all inoperable SPD during the warranty period. Minimum warranty period shall be 10 (ten) years. Acceptable manufacturers listed below that do not meet the 10 year warranty as standard shall submit a letter extending the warranty with the product submittal.

1.4 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data (Including checklist at the end of this Specification)

1.5 SUBMITTALS FOR RECORD ONLY

- A. Test Reports: See Project Specification Section 26 91 00 and 26 08 00
 - 1. SPD Inspection Checklist

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer to be as noted on project drawings or by an acceptable manufacturer. The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the Contractor to ensure that any submittals made are for products that meet or exceed the specifications included herein. Subject to compliance with requirements, provide products by the following manufacturer(s) or "prior-approved" equal as described above:

1. Square D; a brand of Schneider Electric.
2. General Electric, G.E. Energy
3. Surge Suppression Inc.
4. Control Concepts Inc.
5. Emerson Network Power

2.2 GENERAL REQUIREMENTS

- A. SPD devices shall be rated for the class of service necessary for the application. Protection shall be provided L-N, L-G, L-L & N-G (Per IEEE Std. 1100-1999 8.6.1 & NEMA LS-1 2.2.7) for all applications.
- B. Branch panel units must incorporate "True" sine-wave tracking directly connected protection elements for each and every mode within the electrical system to which it is connected. Products utilizing basic EMI/RFI filter performance specifically will not be considered acceptable as equal to sine-wave tracking and therefore are not to be submitted. Products displaying this capability in any less than ALL MODES will be deemed unacceptable (e.g. L-N only, L-L only or L-G only). Sine-wave tracking capability must be demonstrated by furnishing an ANSI/IEEE Category A, 2kV, 67A, 100kHz Ringwave test as defined in ANSI/IEEE C62, at the 270 degree phase angle, with the "let-through voltage" not to exceed 60V in all modes of the device at the voltage rated for the project. Manufacturers not providing this documentation or meeting this requirement for branch panel locations will be deemed unacceptable.
- C. SPD devices shall be designed for AC power systems with a minimum of AC follow current after operation. The surge current rating must be sufficient to meet the requirement of the application at clamp levels below the damage level of the equipment installed.
- D. Manufacturer shall provide permanently-connected devices parallel mounted to the service entrance, distribution, and branch panels, and series connected devices as required for individual equipment protection as indicated on Contract Drawings. SPD device drawings shall be made available upon request.
- E. SPD circuitry shall include only solid-state clamping components to limit the surge voltage and divert the surge current. SPD components that "crowbar" (e.g. spark gaps, gas tubes, SCR's, etc.) shall not be accepted.
- F. Modes: The SPD system shall provide protection for all 10 modes. True distinct and independent protection circuitry for each mode is preferred but not required. Reduced mode SPD with only 3, 4 or 7 dedicated, distinct, independent protection modes are not acceptable and are not to be submitted.
- G. Fusing

1. The SPD shall provide as a minimum, over-current, over temperature protection in the form of component-level thermal fusing to ensure safe failure and prevent thermal runaway. Surge protective devices shall contain short circuit current safety fusing within each device where no upstream circuit breaker is specified, per over-current protection requirements of the NEC 2008.
2. The fusing mechanisms employed must effectively coordinate their performance in conjunction with the high current abnormal over-voltage testing under UL 1449 2nd Edition as defined above.
3. The Surge Protection Device (SPD) shall be of a parallel design using fast-acting transient energy protection that will divert and dissipate the surge energy.
4. The SPD shall be self-restoring and fully automatic with a total response time not to exceed 1 nanosecond.
5. The maximum continuous operating voltage shall be capable of sustaining 115% of nominal RMS voltage continuously without degrading in accordance with NEMA LS-1, 1992.
6. The SPD shall be UL listed at or above the available fault current level (shown on project drawings) at the point of SPD application, per UL 1449 3rd Edition, as amended. The SPD shall be marked with the short circuit current rating. The SPD short circuit rating shall be, as a minimum, the same rating as the power distribution equipment to which it is connected.
7. Circuit Configuration: The circuit configuration of the suppression units shall be bi-directional, thermal stress reducing, totally encapsulated, custom parallel and solid state.

H. Features

1. Surge protective devices shall provide on-board visual status of their operational readiness by indicator lights and one set of NO/NC Form C dry relay contacts for remote alarm capabilities.
2. Surge protective devices shall provide an audible alarm to indicate when SPD has failed or lost a phase of protection. Alarm shall have a push-to-test and mute button to ensure the integrity of the alarming system.

I. Maintenance Restrictions: No suppression unit shall be supplied which requires scheduled preventive- maintenance or replacement parts. Units requiring functional testing, special test equipment, or special training to monitor surge protection device (SPD) status are not acceptable. SPD devices shall require no routine maintenance. SPD devices are considered non-repairable items and shall be fully replaced upon failure.

J. Enclosures: Unless otherwise noted, SPD shall be integrated into the switchgear rated NEMA 4X or better for outdoor/wet locations shall be utilized.

PART 3 EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

- A. Install devices at service entrance on load side, with ground lead bonded to service entrance ground.
- B. Install devices for panelboard and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground. Provide multipole, circuit breaker as a dedicated disconnect for suppressor, unless otherwise indicated.

3.2 PLACING SYSTEM INTO SERVICE

- A. Do not energize or connect service entrance equipment and/or panelboards to their sources until surge protection devices are installed and connected.

3.3 FIELD QUALITY CONTROL

- A. Electrical Service, Distribution Panels, Branch Panelboards, and Motor Control Centers:

1. Provide surge suppressor at each building service entrance and at switchboard mains and motor control center locations as indicated on the drawings. The SPD shall be integrate into the switchboard or switchgear being provided. The switchgear manufacturer providing such products shall expressly meet or exceed ALL parameters of this specification for the SPD devices.
2. Install the SPD per manufacturer's installation instructions (unless otherwise noted on project drawings). The phase and neutral conductors serving the SPD shall be twisted together (one twist per 12" of lead length) to reduce the SPD system input impedance and kept at the minimum length. The SPD shall be installed in strict accordance with the manufacturer's recommended practices and in compliance with N.E.C. requirements. If the SPD manufacturer requires larger size conductors and breaker, Contractor shall provide conductors and breaker size per manufacturer's requirements
3. If lead lengths exceed 18" the Contractor responsible for installation must contact the surge suppression manufacturer for installation assistance.

- B. When installing a series connected SPD, bind the supply side conductors separately from the load side conductors.

END OF SECTION 26 43 13

Not to be used for bidding purposes

SECTION 26 91 00 - FIELD ACCEPTANCE REPORTS

PART 1 GENERAL

1.1 SUMMARY

- A. The requirements of this Section apply to, and are a component part of, the 26 and 27 series project specifications, as noted in individual specifications.

1.2 SUBMITTALS FOR REVIEW/RECORD

- A. Submit all field acceptance reports noted in this specification according to the requirements of the individual specifications. Submission should be under each respective specification section, as required, and not this Section.

PART 2 EXECUTION

2.1 INSTALLATION CHECKLISTS / ACCEPTANCE TESTS / REPORTS

- A. Complete all as noted, per individual 26 and 27 series project specifications, in Attachment A.

2.2 TEST REPORT AND CHECKLIST COMPLETION LOG

- A. Maintain and complete log provided in Attachment A.

ATTACHMENT A

TRANSFER SWITCH INSTALLATION CHECKLIST		
Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	Equipment ID	Manufacturer
Voltage Rating	Current Rating	One Line Sheet

ID	DESCRIPTION	YES	NO	N/A	INITIALS
1	Is the unit free of visible damage?				
2	Does the equipment nameplate data match the drawings and specifications?				
3	Is the unit properly labeled with ID tags and warnings?				
4	Are all the conductors labeled correctly?				
5	Is the ATS installed per drawings and specifications?				
6	Have all breakers been manually operated and function correctly?				
7	Has the continuity been checked phase to ground?				
8	Is the unit properly grounded and bonded?				
9	Are bolted connections torqued per specifications? (<i>NETA Table 100.12.1</i>)				
10	Is the interior clean and free of debris?				
11	Has the unit been completely closed? (<i>all covers and doors installed and KOs sealed</i>)				
12	Is the Megger Test complete and acceptable? (<i>NETA Table 100.1</i>)				
13	Are all low-voltage cables installed per drawings and specifications?				
14	Are the current transformers secured and wired per specification?				
15	Do the indicating lamps and mechanical interlocks function properly?				
16	Are the time delays for transfer and generator shutdown set per contract documents?				
17	Do the phase rotations at normal power and emergency power match?				
18	Does the operation of the power transfer from normal to emergency and return to normal function properly?				

ID	DESCRIPTION	YES	NO	N/A	INITIALS
19	Has the operation of the test switch been verified?				
20	Have all alarms been confirmed?				
21	Is the installation and start-up manual provided?				

NOTES: *(Provide reasoning or actions to be taken for items with "Negative" responses)*

Not to be used for bidding purposes

CABLE REEL INSPECTION

TO BE COMPLETED IF: *(check one)*

- Any visible signs of defect when received (Attach Photos)**
-- OR --
- Manufacturer's certified test report is NOT included with cable upon delivery**
-- OR --
- Difference between ordered cable and received cable**

Basic Reel Info	
Cable ID	
Manufacturer's Name	
Conductor Material	
Conductor Size	
Insulation Type	
Insulation Thickness	
Jacket Thickness	
Temperature Rating	
Length of Cable	
Voltage Class	
Shielded/Non-Shielded	
Date of Manufacture	
Inspection Date	
Inspector Identity	

Fill out available info via reel label or cable jacket.

Date:

Checked By:

Notes:

COVER SHEET

TO BE COMPLETED FOR: *(check one)*

- Factory Test Report**

- Vendor Start-Up / Field Test Report**

- Other:** _____.

Not to be used for bidding purposes

Product Information	
Specification Section	
Job Name and Number	
Date	
Foreman	
Equipment ID	
Equipment Type	
Manufacturer	
One-Line Sheet	

Notes:

GROUNDING & BONDING INSTALLATION CHECKLIST

Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	ID	One Line Sheet

ID	NOTES:	YES	NO	N/A	INITIALS
1	Is the system in compliance with drawings, specifications, and NFPA 70 NEC Article 250?				
2	Have physical and mechanical conditions been inspected for continuity?				
3	Are the bolted connections torqued per specification? (<i>NETA Table 100.12.1</i>)				
4	Are all conduits properly bonded?				
5	Are the grounding system's electrical and mechanical connections free of corrosion?				
6	Is the Megger Test complete and acceptable? (<i>NETA Table 100.1</i>)				
7	Has the Point-to-Point Test been completed to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and derived neutral points?				
8	Is the resistance between the main grounding electrode and ground under 5 ohms?				
9	Have the measurements been recorded on the grounding riser one line for record under As-Built?				

NOTES: Provide reasoning or actions to be taken for items with "Negative" responses.

LOW-VOLTAGE CABLE CHECKLIST		
Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	Circuit ID	Cable Type
Voltage Rating	Current Rating	One Line Sheet

ID	DESCRIPTION	YES	NO	N/A	INITIALS
1	Is the cable marking sufficient for the voltage application?				
2	Is the conductor material and size per the drawings?				
3	Is the bending radius acceptable? <i>(NETA Table 100.22)</i>				
4	Is the Megger Test complete and acceptable? <i>(NETA Table 100.1)</i>				
5	Are the bolted connections torqued per specification? <i>(NETA Table 100.12.1)</i>				
6	Are all phase IDs and cable IDs securely in place and acceptable?				
7	Are termination cabinets clean and free of debris?				

NOTES: *(Provide reasoning or actions to be taken for items with "Negative" responses)*

Not to be used for bidding purposes

MEGGER TEST REPORT

Job # and Name	Date	Panel
Description	Conductor Size	Raceway Type
Cable Length	Insulation Type	Pipe #

TEST RESULTS	
Megger Test Voltage:	1000 V
PHASE A to GROUND	_____ Ω
PHASE B to GROUND	_____ Ω
PHASE C to GROUND	_____ Ω
PHASE A to PHASE B	_____ Ω
PHASE A to PHASE C	_____ Ω
PHASE B to PHASE C	_____ Ω
PHASE A to NEUTRAL	_____ Ω
PHASE B to NEUTRAL	_____ Ω
PHASE C to NEUTRAL	_____ Ω
NEUTRAL to GROUND	_____ Ω

*Fill out what applies

NOTES:

TESTED BY: _____

MEDIUM-VOLTAGE CABLE CHECKLIST		
Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	Circuit ID	Cable Type
Voltage Rating	Current Rating	One Line Sheet

ID	DESCRIPTION	YES	NO	N/A	INITIALS
1	Are all terminations and splices complete?				
2	Is the cable marking sufficient for the voltage application?				
3	Is the conductor material and size per the drawings?				
4	Is the bending radius acceptable? <i>(NETA Table 100.22)</i>				
5	Are the splices complete per manufacturer's instructions and grounded as required per specifications?				
6	Are all cable ends fitted with appropriate classed terminations and all exposed components covered with appropriate fittings?				
7	Are the stress cones complete and grounded?				
8	Have cable and shield continuity checks been performed and phasing verified end to end?				
9	Is the Tan-Delta test complete? <i>(NETA Table 100.6.4)</i>				
10	Have all safety grounds connected for testing been removed?				
11	Are the bolted connections torqued per specification? <i>(NETA Table 100.12.1)</i>				
12	Is fireproofing or insulating tape applied if required by drawings or equipment manufacturer's instructions?				
13	Are all phase IDs and cable IDs securely in place and acceptable?				
14	Are termination cabinets clean and free of debris?				

NOTES: *(Provide reasoning or actions to be taken for items with "Negative" responses)*

TAN-DELTA TEST REPORT

Job # and Name	Date	Panel
Description	Conductor Size	Raceway Type
Cable Length	Insulation Type	Pipe #

TEST RESULTS

PROVIDE TEST EQUIPMENT OUTPUT

Not to be used for bidding purposes

NOTES:

TESTED BY: _____

SWITCHGEAR INSTALLATION CHECKLIST

Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	Equipment ID	Manufacturer
Voltage Rating	Current Rating	One Line Sheet

ID	DESCRIPTION	YES	NO	N/A	INITIALS
1	Is the unit free of visible damage?				
2	Does the equipment nameplate data match the drawings and specifications?				
3	Is the unit properly labeled with ID tags and warnings?				
4	Are all conductors labeled correctly?				
5	Is the switchboard installed per drawings?				
6	Have all lifting hardware and packing supports been removed?				
7	Are the field installed sections correctly bolted together per manufacturer's specifications?				
8	Are all bus ties, including the ground, correctly installed and torqued to manufacturer's specifications?				
9	Are the breakers correctly sized and located per the drawings?				
10	Have all breakers been manually operated and function correctly?				
11	Are the trip units set per the coordination study if required?				
12	Are feeder wires, neutral, and ground sized per drawings and specifications?				
13	Has the continuity been checked phase to ground?				
14	Is the unit properly grounded and bonded?				
15	Are bolted connections torqued per specifications? (<i>NETA Table 100.12.1</i>)				
16	Is the interior clean and free of debris?				
17	Has the unit been completely closed? (<i>all covers and filler plates installed and KOs sealed</i>)				
18	Are all wires correctly phased? (<i>A-B-C left to right</i>)				

ID	DESCRIPTION	YES	NO	N/A	INITIALS
19	Is the Megger Test complete and acceptable? (<i>NETA Table 100.1</i>)				
20	Are all low-voltage cables installed per drawings and specifications?				
21	Do the indicating lamps and mechanical interlocks function properly?				

NOTES: (*Provide reasoning or actions to be taken for items with "Negative" responses*)

Not to be used for bidding purposes

TRANSFORMER INSTALLATION CHECKLIST

Job Name	Job Number	Building Name
PM	Foreman	QA/QC Inspector
Date	Equipment ID	Manufacturer
Voltage Rating	kVA Rating	One Line Sheet

ID	DESCRIPTION	YES	NO	N/A	INITIALS
1	Is the unit free of visible damage?				
2	Does the equipment nameplate data match the drawings and specifications?				
3	Is the unit properly labeled with ID tags and warnings?				
4	Are all conductors labeled correctly?				
5	Is the transformer and pad installed per drawings?				
6	Are all conduit stub-ups in the correct size and location per drawings?				
7	Is the transformer properly anchored per the project seismic requirements and manufacturer's specifications?				
8	Have the vibration isolating pads been installed?				
9	If installed, have any of the impact indicators been triggered?				
10	Are feeder wires, neutral, and ground sized per drawings and specifications?				
11	Has the continuity been checked phase to ground?				
12	Is the unit properly grounded and bonded?				
13	Are bolted connections torqued per specifications? (<i>NETA Table 100.12.1</i>)				
14	Is the interior clean and free of debris?				
15	Has the unit been completely closed? (<i>all covers and filler plates installed and KOs sealed</i>)				
16	Are all wires, primary and secondary, correctly phased? (<i>A-B-C left to right</i>)				
17	Are the taps set as specified or in the normal position?				
18	Has the Transformer Acceptance Test been completed, including the Insulation Resistance and Turns Ratio tests?				

MEDIUM-VOLTAGE TRANSFORMERS ONLY					
ID	DESCRIPTION	YES	NO	N/A	INITIALS
19	Are all low-voltage cables installed per drawings and specifications?				
20	Are the surge arrestors rated and located per drawings and specifications?				
21	Are all alarm and safety devices operational?				
22	Are the fuses per the coordination study if required?				
23	Do all the doors freely open and close?				
24	Is the unit secured with a locking device?				
25	Is the Medium-Voltage Cable Checklist complete?				
26	Is the Tan-Delta Test complete?				

NOTES: (Provide reasoning or actions to be taken for items with "Negative" responses)

Not to be used for bidding purposes

EXAMPLE IR SCAN

Equipment: SWGR 3
 Location: Main (Breaker)

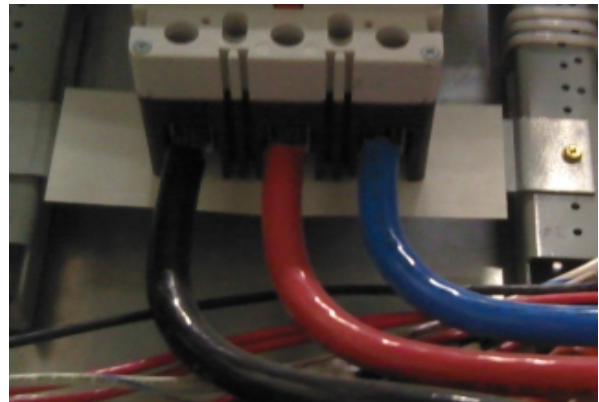
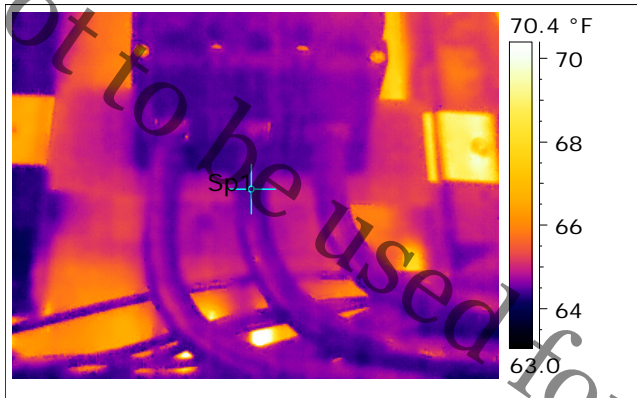


Image Date	Image Time	Image File name	Image Max. Temperature	Image Min. Temperature
4/15/2019	3:00:00 PM	FLIRXXXX.jpg	72.5 °F	63.9 °F

Parameters

Emissivity	0.95
Reflected Temperature	68.0 °F
Object Distance	3.3 ft
Atmospheric Temperature	68.0 °F
External Optics Temperature	68.0 °F
External Optics Transmission	1.00
Relative Humidity	50.0 %

END OF SECTION 26 91 00

SECTION 27 05 28 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the horizontal cable pathway system of non-continuous cable supports, conduit or cable tray as described in the drawings.
- B. The drawings indicate the general route of the raceway system. Data presented on the drawings is as accurate as preliminary surveys and planning can determine. Accuracy is not guaranteed and field verification of all dimensions, routing, etc. is required.
- C. Specifications and drawings are for assistance and guidance, but exact routing, locations, distances and levels will be governed by actual field conditions. Contractor is directed to make field surveys as part of his work prior to submitting system layout drawings.

1.2 DESCRIPTION

A. System Description:

- 1. This system consists of empty raceways as shown on the drawings and described herein.

B. Grounding and Bonding

- 1. In the United States horizontal pathways must be grounded and bonded in compliance with the requirements and practices in the NEC, except where other codes or authorities have more stringent requirements. In addition to creating a serious safety risk, improper grounding of telecommunication pathways may increase susceptibility to Electromagnetic Interference (EMI).
- 2. When grounding telecommunication pathways ensure that the installation conforms with applicable practices and codes, ANSI J-STD-607-A, Commercial Building Grounding and Bonding Requirements for Telecommunications, the NEC, and Local Building Codes.

1.3 RESPONSIBILITIES

- A. Installer shall be responsible for providing all equipment, and associated supports, splices, terminating hardware, etc. as necessary to provide a functional cable support system.
- B. Installer shall be responsible for providing all equipment, conduit and associated support, splices, terminating hardware, etc. as necessary to provide a functional cable support system within new switchgear.
- C. Installer shall be responsible for providing all back-boxes, pull-boxes, junction boxes, conduit, and sleeves as indicated in the plans and specifications to support the low voltage systems.
- D. Installer shall be responsible for coordinating installation with the Owner to insure pathways are not impeding other system installations.

1.4 SUBMITTALS FOR RECORD ONLY

- A. Product Data
- B. As-Built Drawings

PART 2 PRODUCTS

2.1 CONDUITS/SLEEVES

A. General

1. Conduit/sleeve shall be rigid galvanized or heavier.
2. Any conduit/sleeve installed for communication cabling shall have a connector on each end with a plastic bushing for cable protection.
3. Any section of conduit shall not contain an individual bend of more than 90 degrees.
4. Any section of conduit shall not contain more than two 90 degree bends or an aggregate of bends in excess of 180 degrees between any two pull/termination points. Under no circumstance will a pull box be used to transition direction of conduit system. Pull boxes shall be installed in a straight section of conduit run and not used in lieu of a bend. The corresponding conduit ends shall be aligned with each other.
5. There shall be no section of continuous conduit longer than 100 feet without a pull box at either end unless approved by engineer. These boxes will not be shown on drawings. Refer to the table below for pull box sizing.
6. Each conduit bend should be a long sweep radius wherever possible. In no instance shall the inside radius or bend be less than six (6) times the internal diameter of the conduit for conduits that are 2" in diameter or less, for conduits larger than 2" the bend radius shall be no less than 10 (ten) times the inside diameter.
7. All conduit/sleeves shall be bonded to ground on one or both ends in accordance with national and local requirements.
8. Provide nylon or plastic pull strings in all conduit runs.
9. Telecommunications conduits shall be separated from power conduit by not less than 12-inches.
10. All conduits/sleeves shall be secured and strapped to building surfaces per National Electric Code Article 358.30 (A) and (B).

B. Pull Boxes

1. All pull boxes installed in low voltage communications conduit runs shall be sized per Table 12 of TIA 569-B Commercial Building Standard for Telecommunications Pathways and Spaces. The table below is for reference only; refer to the TIA 569-B for exact box sizing.

Table 12 of TIA 569-B Commercial Building Standard for Telecommunications Pathways and Spaces.

Conduit Trade Size mm (in)	Width mm (in)	Length mm (in)	Depth mm (in)	Width Increase for Additional Conduit mm (in)
27 (1)	102 (4)	406 (16)	76 (3)	51 (2)
35 (1-1/4)	152 (6)	508 (20)	76 (3)	73 (3)
41 (1-1/2)	203 (8)	686 (27)	102 (4)	102 (4)
53 (2)	203 (8)	914 (36)	102 (4)	127 (5)
63 (2-1/2)	254 (10)	1067 (42)	127 (5)	152 (6)
78 (3)	305 (12)	1219 (48)	127 (5)	152 (6)
91 (3-1/2)	305 (12)	1372 (54)	152 (6)	152 (6)
103 (4)	381 (15)	1524 (60)	203 (8)	203 (8)

2.2 INNERDUCT

- A. Flexible optical fiber/communication raceway.
- B. A non-metallic raceway, usually circular, placed within a larger raceway. (Sub duct)
- C. Manufacturers
 - 1. Provide products offered by MaxCell Group/TVC Communications
- D. Materials
 - 1. Green Polyester and Nylon resin polymer
- E. Textile Innerduct
 - 1. Standard Outdoor Textile Innerduct: Micro (33mm), 4-inch multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape. Maxcell MXE86383GR
- F. Innerduct Fittings
 - 1. Conduit Plugs shall be compression-type conduit plugs with locking nuts for sealing and securing one or more textile innerducts within a 4-inch inside diameter conduit, e.g.: 4-inch plug with nine holes for cables in a 3 pack (9-cell) configuration
 - 2. Termination Bags shall be inflation-type bags for sealing and securing around one or more textile innerducts and cables within 2-inch outside diameter or larger conduit.
- G. Pull Tape
 - 1. Include measuring and pulling tape constructed of synthetic fiber, printed with accurate sequential footage marks. Color-coded.
- H. Penetration Sealing Materials
 - 1. Duct Water Seal shall be products suitable for closing underground and entrance conduit openings where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure.

PART 3 EXECUTION

3.1 CABLE PATHWAYS

- A. Pathways will be conduits supported by threaded rod or wall brackets, or supported to structure, as per the NEC.

3.2 CONDUIT INSTALLATION

- A. Cable pathways; a dedicated pathway shall be provided for structured cabling metering communications.
- B. Install all pathway systems as per manufacturers recommended practices and as per local governmental regulations and NEC, and BICSI regulations and practices.
- C. Provide conduit system as shown on the drawings and as specified herein.
- D. Terminate metal conduit using connectors with plastic bushings.
- E. Provide nylon or plastic pull string in all conduit runs.
- F. Ground conduits at terminal boards with grounding bushings.
- G. Telecommunications conduits shall be separated from power conduits by not less than 12-inches.
- H. Conduit installation shall be coordinated with the switchgear equipment layout as required to provide adequate dedicated space for equipment provided and installed by Owner's communication vendor(s).
- I. Any section of conduit longer than 100 feet or containing more than two (2) 90 degree bends shall have pull boxes. These boxes may not be shown on drawings.
- J. Separation from EMI Sources:
 - 1. Comply with BICSI TDMM and TIA/EIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
 - 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).

- c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 INNERDUCT INSTALLATION

- A. Provide textile innerduct in conduit and wire ways using continuous un-spliced lengths of textile innerduct between maintenance holes, pull boxes, and/or termination points as indicated on the drawings.
- B. Make a 2" incision, approximately 18" from the end of textile innerduct. Pull out and cut off approximately 2 feet of pull-tape. Thus allowing the pull tape ends to retract back into the cells.
- C. Using approximately 6 feet of pull tape, tie a non-slip knot to the incision. Then tie 3 to 6 half-hitch knots down to the end of textile innerduct. Apply black vinyl tape over all knots and the end of textile innerduct. Using a Bow Line knot tie a swivel to the end of 3 feet pull tape. For multi-pack installations one swivel is sufficient, but stagger each textile innerduct.
- D. Using a Bow Line knot, attach the pull rope located in the rigid conduit to the other end of the swivel. Install textile innerduct – ensuring that no twist is introduced to the innerduct.
- E. Provide suitable textile innerduct slack in the maintenance holes, hand holes, pull boxes, and at turns to ensure there is no kinking or binding of the product.
- F. Textile Innerduct Mountings, Hangers and Attachments: When exposed indoors or in maintenance holes, hold firmly in place using independent support.
 1. Design & install hangers and other similar fittings adequate to support loads and so as to not damage innerduct.
 2. Do not fasten textile innerduct to steam, water, or other piping, ductwork, mechanical equipment, electrical equipment, electrical raceways, or wires
 3. When appropriate, use the following cable ties to secure textile innerduct through previously created incisions:
 - a. Plenum areas: plenum-rated plastic or stainless steel
 - b. Non plenum areas: Conventional flame-retardant nylon ties
 - c. Underground locations : Conventional plastic cable ties
- G. Maintenance Hole and Hand Hole Installation:
 1. At locations where textile innerduct will be continuous through a manhole or hand hole, allow sufficient slack so that the innerduct may be secured to the side of the vault maintaining the minimum bend radius.

2. At maintenance holes serving as the junction location, pull the exposed end of the innerduct to the far end of the vault, install termination bag, and secure to the vault.

END OF SECTION 27 05 28

Not to be used for bidding purposes

SECTION 32 32 23 – MODULAR CONCRETE RETAINING WALL

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work shall consist of designing, furnishing and construction of a Keystone Compac III unit retaining wall system in accordance with these specifications and in reasonable close conformity with the lines, grades, design and dimensions shown on the plans. No alternate wall systems will be considered.
- B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit drainage fill and backfill to the lines and grades shown on the construction drawings.
- C. Work includes furnishing and installing geogrid soil reinforcement of the type, size, location and lengths designated on the construction drawings.
- D. The proposed work shall match the existing retaining wall at the Excess Flow Pump Station in general design, block face style, and block color.

1.2 REFERENCE DOCUMENTS

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 252 Corrugated Polyethylene Drainage Pipe
 - 2. AASHTO M 288 Geotextile Specification for Highway Applications
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM C140 Sampling and Testing Concrete Masonry Units
 - 2. ASTM C1372 Specification for Dry-Cast Segmental Retaining Wall Units
 - 3. ASTM D442 Particle Size Analysis of Soils
 - 4. ASTM D698 Laboratory Compaction Characteristics of Soil – Standard Effort
 - 5. ASTM D1557 Laboratory Compaction Characteristics of Soil – Modified Effort
 - 6. ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer pipe and Fittings
 - 7. ASTM D4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
 - 8. ASTM D4475 Horizontal Shear Strength of Pultruded Reinforced Plastic Rods
 - 9. ASTM D4476 Flexural Properties of Fiber Reinforced Pultruded Plastic Rods
 - 10. ASTM D4595 Standard Test Method for Tensile Properties of Geotextiles by Wide-Width Strip Method
 - 11. ASTM D5262 Standard Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
 - 12. ASTM D5818 Standard Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage
 - 13. ASTM D6637 Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Method
 - 14. ASTM D6638 Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units
 - 15. ASTM D6706 Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil

16. ASTM D6916 Standard Test Method for Determining the Shear Strength Between Segmental Concrete Units

C. National Concrete Masonry Association (NCMA)

1. NCMA SRWU-1 Test Method for Determining Connection Strength of SRW
2. NCMA SRWU-2 Test Method for Determining Shear Strength of SRW

1.3 DEFINITIONS

- A. Compac III Unit – a concrete retaining wall element machine made from Portland cement, water, aggregates, manufactured by a licensed manufacturer of Keystone.
- B. Structural Geogrid - a structural element formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.
- C. Unit Drainage Fill – drainage aggregate that is placed within and immediately behind the Keystone concrete units.
- D. Reinforced Backfill – compacted soil that is placed within the reinforced soil volume as outlined on the plans.

1.4 SUBMITTALS AND CERTIFICATION

- A. Contractor shall submit a Manufacturer's certification, prior to the start of work, that the retaining wall system components meet the requirements of this specification and the structure design.
- B. Contractor shall submit construction drawings and design calculations for the retaining wall system prepared and stamped by a Professional Engineer registered in the state of the project. The engineering designs, techniques, and material evaluations shall be in accordance with the Keystone Design Manual.

1.5 QUALITY ASSURANCE

- A. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude by the wall installer where the Compac retaining wall system has been constructed successfully. Contact names and phone numbers shall be listed for each project.
- B. Contractor shall provide evidence that the design engineer has a minimum of five years documented experience in the design of reinforced soil structures. The design engineer shall provide proof of current professional liability insurance with an aggregate coverage limit of not less than \$2,000,000.
- C. Owner shall provide quality assurance inspection and testing during earthwork and wall construction operations. Contractor shall provide all quality control testing and inspection not provided by the owner. Owner's quality assurance program does not relieve the contractor of responsibility for quality control and wall performance.

1.6 DELIVERY HANDLING AND STORAGE

- A. Contractor shall check all materials upon delivery to assure that the proper type, grade, color, and certification have been received.
- B. Contractor shall protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

PART 2 PRODUCTS

2.1 KEYSTONE CONCRETE RETAINING WALL UNITS

- A. Keystone Compac III retaining wall units shall conform to the following architectural requirements
 1. Face color - concrete gray, unless otherwise specified. The Owner may specify standard manufacturers' color.
 2. Face finish - hard split in angular tri-plane or straight face configuration. Other face finishes will not be allowed without written approval of Owner.
 3. Bond configuration - running with bonds nominally located at midpoint in vertically adjacent units, in both straight and curved alignments.
 4. Exposed surfaces of units shall be free of chips, cracks or other imperfections when viewed from a distance of 10 feet (3 m) under diffused lighting.
- B. Keystone concrete units shall conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.
- C. Keystone concrete units shall conform to the following structural and geometric requirements measured in accordance with ASTM C140 Sampling and Testing Concrete Masonry Units:
 1. Compressive strength: ≥ 3000 psi (21 MPa).
 2. Absorption: ≤ 8 % for standard weight aggregates.
 3. Dimensional tolerances: $\pm 1/8$ " (3 mm) from nominal unit dimensions not including rough split face.
 4. Unit Size: 8" (203 mm) (H) x 18" (457 mm) (W) x 12" (304 mm) (D) minimum.
 5. Unit weight: 67 -lbs/unit (30 kg/unit) minimum for standard weight aggregates.
- D. Keystone concrete units shall conform to the following performance testing:
 1. Inter unit shear strength in accordance with ASTM D6916 (NCMA SRWU-2): 600-plf (8 kN/m) minimum at 2-psi (13 kPa) normal pressure;
 2. Geogrid/unit peak connection strength in accordance with ASTM D6638 (NCMA SRWU-1): 500-plf (7 kN/m) minimum at 2-psi (13 kPa) normal force.
- E. Keystone concrete units shall conform to the following constructability requirements:
 1. Vertical setback: $1/8$ inch (3 mm) \pm per course (near vertical) or 1 inch (25 mm) + per course, per the design.
 2. Alignment and grid attachment mechanism - fiberglass pins, two per unit.
 3. Maximum horizontal gap between erected units shall be $\leq 1/2$ inch (13 mm).

2.2 SHEAR AND REINFORCEMENT PIN CONNECTORS

A. Shear and reinforcement pin connectors shall be 1/2-inch (12 mm) diameter thermoset isophthalic polyester resin pultruded fiberglass reinforcement rods to provide connection between vertically and horizontally adjacent units and geosynthetic reinforcement, with the following requirements:

1. Flexural Strength in accordance with ASTM D4476: 128,000 psi (882 MPa) minimum.
2. Short Beam Shear in accordance with ASTM D4475: 6,400 psi (44 MPa) minimum.

B. Shear and reinforcement pin connectors shall be capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.

2.3 BASE LEVELING PAD MATERIAL

A. Material shall consist of a compacted crushed stone base, sand and gravel or unreinforced concrete, as shown on the construction drawings.

2.4 UNIT DRAINAGE FILL

A. Unit drainage fill shall consist of clean 1 inch (25 mm) minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch (25 mm)	100
3/4-inch (19mm)	75 – 100
No. 4 (4.75 mm)	0 – 10
No. 50 (300 um)	0 - 5

B. Drainage fill shall be placed within the cores of, between, and behind the units as indicated on the design drawings. Not less than 1.3 cubic foot (0.036 m³), of drainage fill shall be used for each square foot (0.093 m²) of wall face unless otherwise specified.

2.5 REINFORCED BACKFILL

A. Reinforced backfill shall be free of debris and meet the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch (50 mm)	100
3/4-inch (19 mm)	75 – 100
No. 40 (425 um)	0 – 60
No. 200 (75 um)	0 – 35

Plasticity Index (PI) < 15 and Liquid Limit < 40, per ASTM D4318

B. The maximum aggregate size shall be limited to 3/4 inch (19 mm) unless installation damage tests have been performed to evaluate potential strength reductions to the geogrid design due to increased installation damage during construction.

C. Material can be site-excavated soils where the above requirements can be met. Soils not meeting the above criteria, including highly plastic clays and organic soils, shall not be used in the backfill or reinforced backfill soil mass.

- D. Contractor shall submit reinforced fill sample and laboratory test results to the Architect/Engineer for approval, prior to the use of any proposed reinforced backfill material.

2.6 GEOGRID SOIL REINFORCEMENT

A. Geosynthetic reinforcement shall consist of geogrids manufactured for soil reinforcement applications and shall be manufactured from high tenacity polyester yarn or high density polyethylene. Polyester geogrid shall be made from high tenacity polyester filament yarn with a molecular weight exceeded 25,000 g/m and with a carboxyl end group value less than 30. Polyester geogrid shall be coated with an impregnated PVC coating that resists peeling, cracking and stripping.

B. T_a – Long Term Allowable Tensile Design Load. T_a of the geogrid material shall be determined as follows: $T_a = T_{ult}/(RF_{cr} * RF_d * RF_{id} * FS)$. T_a shall be evaluated based on a 75 year design life.

1. T_{ult} – Short Term Ultimate Tensile Strength. T_{ult} shall be determined in accordance with ASTM D4595 or ASTM D6637. T_{ult} is based on the minimum average roll values (MARV).
2. RF_{cr} – Reduction Factor for Long Term Tension Creep. RF_{cr} shall be determined from 10,000 hour creep testing performed in accordance with ASTM D5262. $RF_{cr} = 1.45$ minimum.
3. RF_d – Reduction Factor for Durability. RF_d shall be determined from polymer specific durability testing covering the range of expected soil environments. $RF_d = 1.10$ minimum.
4. RF_{id} – Reduction Factor for Installation Damage. RF_{id} shall be determined from product specific construction damage testing performed in accordance with ASTM D5818. Test results shall be provided for each product to be used with project specific or more severe soil types. $RF_{id} = 1.05$ minimum.
5. FS – Overall Design Factor of Safety. FS shall be 1.5 unless noted for the maximum allowable working stress calculation.

C. The maximum design tensile load of the geogrid shall not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection divided by a factor of safety of 1.5. The connection strength testing and computation procedures shall be in accordance with ASTM D6638 Connection Strength between Geosynthetic Reinforcement and Segmental Concrete Units or NCMA SRWU-1.

D. C_i – Coefficient of Soil Interaction. C_i values shall be determined per ASTM D6706 at a maximum 0.75 inch (19 mm) displacement.

E. The geogrid manufacturer shall have a Manufacturing Quality Control program that includes QC testing by an independent laboratory. The QC testing shall include Tensile Strength testing, Melt Flow Index testing for HDPE geogrids and Molecular Weight testing for polyester geogrids.

2.7 DRAINAGE PIPE

A. If required, drainage pipe shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D3034 or corrugated HDPE pipe manufactured in accordance with AASHTO M252.

2.8 GEOTEXTILE FILTER FABRIC

- A. When required, geotextile filter fabric shall be a needle-punched nonwoven fabric that meets the requirements of AASHTO M288.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. The Owner or Contractors QA/QC representative shall inspect the excavation and test the foundation soils and approve prior to placement of the leveling pad material or fill soils. Any over-excavation required to remove unsuitable soils shall be oversized from the front of the leveling pad and back of the geogrid reinforcement. Proof roll foundation area as directed to determine if remedial work is required.
- B. Over-excavation and replacement of unsuitable soils and replacement with approved compacted fill will be compensated as agreed upon with the Owner.

3.2 BASE LEVELING PAD

- A. Leveling pad material shall be placed to the lines and grades shown on the construction drawings to a minimum thickness of 6 inches (150 mm) and extend laterally a minimum of 6 inches in front and behind the Keystone wall unit.
- B. Soil leveling pad materials shall be compacted to a minimum of 95% of Standard Proctor density per ASTM D697 or 92% Modified Proctor density per ASTM D1557.
- C. Leveling pad shall be prepared to insure full contact with the base surface of the concrete units.

3.3 KEYSTONE UNIT INSTALLATION

- A. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.
- B. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.
- C. Install shear/connecting pins per manufacturer's recommendations.
- D. Place and compact drainage fill within and behind wall units. Place and compact reinforced backfill soil behind drainage fill.
- E. Maximum stacked vertical height of wall units, prior to drainage fill and backfill placement and compaction, shall not exceed two courses.

3.4 STRUCTURAL GEOGRID INSTALLATION

- A. Geogrid shall be installed with the highest strength direction perpendicular to the wall alignment.

- B. Geogrid reinforcement shall be placed at the strengths, lengths and elevations shown on the construction drawings, or as directed by the engineer.
- C. The geogrid shall be laid horizontally on compacted backfill and attached to the Keystone wall unit pins and within 1 inch of the face of the units. Place the next course of Keystone units over the geogrid. The geogrid shall be pulled taut and anchored prior to backfill placement on the geogrid.
- D. Geogrid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps greater than 2 inches between adjacent pieces of geogrid are not permitted.

3.5 REINFORCED BACKFILL PLACEMENT

- A. Reinforced backfill shall be placed, spread and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage to the geogrid.
- B. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches (150 mm) where hand operated compaction equipment is used, or 8 – 10 inches (200 to 250 mm) where heavy compaction equipment is used. Lift thickness shall be decreased to achieve the required density, as needed.
- C. Reinforced backfill shall be compacted to a minimum of 95% of Standard Proctor density per ASTM D697 or 92% Modified Proctor density per ASTM D1557. The moisture content of the reinforced backfill material during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum by 0 to 3 percentage points of moisture.
- D. Only hand operated compaction equipment shall be allowed within 3 feet (1 M) from the back of the Keystone concrete units.
- E. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches (150 mm) is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging or displacing the Keystone units or geogrid.
- F. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and turning shall be avoided.
- G. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from the wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.6 CAP INSTALLATION

- A. Prior to placement of the cap units, the upper surface of the top course of wall units shall be cleaned of soil and any other material.
- B. Cap units shall be adequately glued to the underlying wall units with an all-weather exterior construction adhesive.

3.7 AS-BUILT CONSTRUCTION TOLERANCES

- A. Vertical alignment: ± 1.5 inches (40 mm) over any 10 foot (3 m) distance.
- B. Wall batter: within 2 degrees of design batter. Overall wall batter shall be ≥ 0 degrees.
- C. Horizontal alignment: ± 1.5 inches (40 mm) over any 10 foot (3 m) distance.
- D. Corners and curves: ± 1 foot (300 mm) to theoretical location.
- E. Maximum horizontal gap between erected units shall be $\leq 1/2$ inch (13 mm).

3.8 FIELD QUALITY CONTROL

- A. Quality Assurance – The owner shall/may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction quality control testing.
- B. Quality assurance should include foundation soil inspection and testing and verification of the geotechnical design parameters and verification that the contractor's quality control testing is adequate as a minimum. Quality assurance shall also include observation of the construction for general compliance with the design drawings and project specifications. Quality assurance is usually best performed by the site geotechnical engineer.
- C. Quality Control – The Contractor shall engage independent inspection and testing services to perform the minimum quality control testing described in the retaining wall design plans and specifications. Only qualified and experienced technicians and engineers shall perform quality control testing and inspection services.
- D. Quality control testing shall include soil and backfill testing to verify soil types and strengths, compaction and moisture conditions and verification that the retaining wall is being constructed in accordance with the design plans and specifications.

END OF SECTION 32 32 23

SECTION 33 71 19 - ELECTRICAL UNDERGROUND DUCTS AND MANHOLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nonmetallic duct.
- B. Manholes.

1.2 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems

1.3 REFERENCE STANDARDS

- A. ASTM G 857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures; 2007.
- B. ASTM D1785 Standard Specification for PolyVinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
- C. IEEE C2 - National Electrical Safety Code; Institute of Electrical and Electronic Engineers; 2007.
- D. NEMA TC 6&8 - Polyvinyl Chloride (PVC) Plastic Utilities for Underground Installations; National Electrical Manufacturers Association; 2003.
- E. NEMA TC 9 - Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation; National Electrical Manufacturers Association; 2004.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Project Record Documents: Record actual routing and elevations of underground conduit and duct, and locations and sizes of manholes.

1.5 SUBMITTALS FOR REVIEW/RECORD

- A. Product Data

1.6 SUBMITTALS FOR RECORD ONLY

- A. As-Built Drawings

PART 2 PRODUCTS

2.1 DUCT BANK

- A. Use stackable spacers that will maintain a minimum 2" of vertical and lateral separation between conduits. See Section 26 05 43.
- B. The concrete shall be placed on a minimum 10" bed of compacted CA-6 crushed stone. Concrete shall be a 4,500 psi full air mix (6%+/-). Backfill with 10" select trench' minimum 24" depth below grade.
- C. Install #5 bar spaced 8" apart along the length of the duct bank. Install #3 bar cage around duct bank every 12". See project drawings for additional detail.

2.2 PRECAST CONCRETE MANHOLES

- A. Description: Precast manhole designed in accordance with ASTM C 858, comprising modular, interlocking sections complete with accessories.
- B. Manhole structure shall comply with all applicable requirements of any IL DOT standards relating to concrete manhole structures.
- C. Loading: ASTM C 857, Class A-16.
- D. Shape: As indicated. 3' Wide x 4' Long x 4' Deep as indicated on drawings.
- E. Base Section: Include 3 inch deep x 14 inch round sump with cast sleeve, and two 1 inch ground rod openings.
- F. Top Section: Include 32 inch diameter grooved opening for frame and cover.
- G. Duct Entry Provisions: Window knockouts.
- H. Duct Entry Size: Per drawing details.
- I. Cable Pulling Irons: Use galvanized rod and hardware. Locate opposite each duct entry. Provide watertight seal.
- J. Cable Rack Inserts: Minimum load rating of 800 pounds (365 kg). Locate at 10 feet on center and top to bottom.
- K. Manhole Steps: Polypropylene plastic manhole step with 1/2-inch steel reinforcement.
- L. Ladder: Aluminum, with top hook to engage manhole step in riser casting. Provide one ladder for each manhole.
- M. Provide grounding lugs connected to rebar as noted on plans.

2.3 ACCESSORIES

- A. Underground Warning Tape: 6 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines. See Section 26 0553.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.
- C. Verify locations of manholes and underground conflicts if any prior to excavating for installation.
- D. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.
- E. Manhole locations are shown in approximate locations unless dimensions are indicated. Locate as required to complete ductbank system.

3.2 DUCT BANK INSTALLATION

- A. Excavate trenches for ductbank to adequate width, depth and proper slop as specified. Install duct to locate top of ductbank at depths as indicated on drawings. The top of the concrete duct bank envelope shall be not less than 24 inches below grade.
- B. Use forms on sides for duct bank if excavation is not of proper firmness to prevent cave-in.
- C. Install duct with minimum slope of 4 inches per 100 feet (0.33 percent). Slope duct away from building entrances.
- D. Install spacers as recommended by conduit or spacer manufacturer but not to exceed a maximum of 6 ft-0 in. on center for PVC conduit. Stagger conduit joints in concrete encasement 6 in. minimum horizontally.
- E. When entering an existing manhole, core drill existing walls slightly larger than the conduits. Install the conduits, using link seal between the outside conduit wall and the wall of the concrete hole.
- F. For manhole wall penetration, provide protection against vertical shearing. Reinforcing steel in the ductbank is poured or doweled into the wall to provide protection against vertical shearing.
- G. Cut duct square using saw or pipe cutter; de-burr cut ends.
- H. Insert duct to shoulder of fittings; fasten securely.
- I. Join nonmetallic duct using adhesive as recommended by manufacturer.
- J. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum. Install no more than two 90-degree bends between manholes for primary conduit, and no more than three 90-degree bends for communications conduit.
- K. Provide suitable fittings to accommodate expansion and deflection where required.
- L. Terminate duct at manhole entries using end bell.
- M. Stagger duct joints vertically in concrete encasement 6 inches minimum.

- N. Use suitable separators and chairs installed not greater than 6 feet on centers.
- O. Band ducts together before backfilling. Compact backfill around ductbank.
- P. Securely anchor duct to prevent movement during concrete placement.
- Q. Provide minimum 3 inch concrete (dyed red) cover at bottom, top, and sides of ductbank.
- R. Provide suitable pull string in each empty duct except sleeves and nipples.
- S. Use swab to clean ducts before pulling cables. Use a mandrel/swab that is approximately 0.25 inch smaller than the duct diameter. Remove all foreign material from the ducts. Use suitable caps to protect installed duct against entrance of dirt and moisture.
- T. Interface installation of underground warning tape with backfilling. Install tape 12 inches below finished surface. Tape shall be 6" wide minimum, 5 mil thickness, and contain a foil core. Tape color shall be red and labeled with the words "CAUTION-BURIED ELECTRIC LINE BELOW" as manufactured by Presco or similar.
- U. Where the duct bank meets a manhole wall, tie the duct bank reinforcing steel rods into the manhole wall. This will ensure a permanent connection that will protect against vertical and lateral shearing. To accept the steel rod, drill a dowel hole that will penetrate halfway into the wall thickness. Select a hole diameter that is slightly larger than the rod diameter, and is consistent with the epoxy manufacturer's instructions. Do not drill completely through the concrete wall.
- V. Extend concrete envelope to finish floor grade or interior wall surface in buildings and finish pad grade at equipment. Maintain moisture seal.
- W. After completion of ductbank installation, return all ground and pavement surfaces to original condition or to condition as indicated on the drawings. This includes all sidewalks, curbs, streets, parking areas, lawns, shrubs, etc.

END OF SECTION 33 71 19

Substation 3-6 Electrical Upgrades

Capital Project No. 2023

Section II

Contract Forms

**Rock River Water Reclamation District
Rockford, Illinois**

Not to be used for bidding purposes

Not to be used for bidding purposes

Proposal

Project: Substation 3-6 Electrical Upgrades, Capital Project No. 2023

Location: 3333 Kishwaukee Street
Rockford, IL 61103

Completion Date: December 1, 2019

Liquidated Damages: \$300/calendar day per each completion date deadline

To: Board of Trustees
Rock River Water Reclamation District
3501 Kishwaukee Street
Rockford, IL 61109

From: _____
(Individual, Partnership or Corporation, as case may be)

(Address of Individual, Partnership or Corporation)

Gentlemen:

I (We), the undersigned, hereby propose to furnish all materials, equipment, tools, services, labor, and whatever else may be required to construct and place in service the above subject Sanitary Sewer for the Rock River Water Reclamation District all in accordance with the plans and specifications, provided by the Rock River Water Reclamation District. The undersigned also affirms and declares:

1. That I (we), have, examined and am (are) familiar with all the related contract documents and found that they are accurate and complete and are approved by the undersigned.
2. That I (we), have carefully examined the site of the work, and that, from my (our) investigation, has satisfied myself (ourselves) as to the nature and location of the work, the character, quality, and quantity of materials and the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, effect the work or its performance.

3. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same purposes, and is in all respects fair and without collusion or fraud; and that I (we) are not barred from bidding as a result of a bid-rigging or bid-rotating conviction.
4. That accompanying the Proposal is a Bidder's Bond in the amount specified in Article 1, Notice to Bidders, payable to the Board of Trustees of the Rock River Water Reclamation District, which it is agreed, shall be retained as liquidated damages by said Rock River Water Reclamation District if the undersigned fails to execute the Contract in conformity with the contract documents incorporated in the contract documents and furnish bond as specified, within ten (10) days after notification of the award of the contract to the undersigned.
5. The Bidder is of lawful age and that no other person, firm or corporation has any interest in this Proposal or in the Contract proposed to be entered into.
6. The Bidder is not in arrears to the Rock River Water Reclamation District, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the Rock River Water Reclamation District.
7. No officer or employee or person whose salary is payable in whole or in part by the District is, shall be or become interested, directly or indirectly as a contracting party, partner, stockholder, surety or otherwise, in this Proposal, or in the performance of the Contract, or in the work to which it is relates, or in any portion of the profits thereof.
8. The Bidder which I represent complies with all applicable requirements of the Americans with Disabilities Act (ADA) and the Occupational Safety and Health Act (OSHA) and that if said bidder is awarded a contract, it will complete all OSHA-required or ADA-required employee and customer training, will make available all required information, and will hold harmless and indemnify the District and the District's representatives.

In regard to participation in an approved Apprenticeship program, upon request, Contractor will be required to provide written proof of participation.

9. The undersigned, as Bidder, declares that he has adopted and promulgated written sexual harassment policies in accordance with Public Act 99-093 and will make this information available upon request.
10. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including the Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor. The successful Bidder shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Prevailing wage rates may be found on the Illinois Department of Labor website at www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx.

The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (SBE 348) or other approved equal.

11. The undersigned, as Bidder, declares he will comply with the Federal Drug Free Workplace Act.
12. The undersigned, as Bidder, declares he will comply with Public Act 83-1030 entitled "Steel Products Procurement Act".
13. The undersigned, as Bidder, declares he will comply with Public Act 96-929 (30 ILCS 570) regarding Illinois residents employment.
14. The undersigned, as Bidder, declares he will comply with non-discrimination in employment in accordance with the Illinois Fair Employment Practices Commissions Rules & Regulations.

15. The undersigned, as Bidder, declares that he currently participates in an apprenticeship or training program that is registered with the United States Department of Labor's Bureau of Apprenticeship and Training or other acceptable State of Illinois Department of Labor monitored program.

In submitting this bid, it is understood that the right is reserved by the Rock River Water Reclamation District to reject any and all bids. It is agreed that this bid may not be withdrawn for a period of sixty (60) days from the opening thereof.

The undersigned further declares that he (they) has (have) carefully examined the following items of work and that the cost of all the work to complete this project is given in this Proposal.

Not to be used for bidding purposes

LUMP SUM BID AMOUNT

Total Amount of Lump Sum Bid, expressed in figures, for providing all materials, equipment, and labor to complete this project in conformity with all specifications in this Invitation to Bid:

\$ _____.

Estimated amount of copper salvage from existing switchboard included in this bid:

\$ _____.

The undersigned acknowledges that they have received Addendum numbers ____, ____, ____, and realizes that all Addenda are considered part of the contract.

Date: _____

Bidder: _____ By: _____
(print name of firm) (authorized rep's signature)

_____ (print street address) _____ (print rep's name)

_____ (print city, state, zip) _____ (print rep's title)

_____ (area code and phone number) _____ (facsimile number)

Note: The Rock River Water Reclamation District, a Governmental Unit, pays neither Federal Excise Tax nor Illinois Retailers' Occupational Tax. The bidder shall exclude those taxes from their bid.

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Fair Employment Practices Affidavit of Compliance

PROJECT: Substation 3-6 Electrical Upgrades, Capital Project No. 2023

NOTE: THE BIDDER MUST EXECUTE THIS AFFIDAVIT AND SUBMIT IT WITH ITS SIGNED BID. THE ROCK RIVER WATER RECLAMATION DISTRICT CANNOT ACCEPT ANY BID WHICH DOES NOT CONTAIN THIS AFFIDAVIT

_____, being first duly sworn, deposes and says that:
(Name of person making affidavit)

They are: _____ of _____
(Officer's Title) (Company Name)

that said company is and "Equal Opportunity Employer" as defined by Section 2000(e) of Chapter 21, Title 42 of the United States Code annotated and Federal Executive Orders #11375 which are incorporated herein by reference;

and that said company will comply with any and all requirements of Title 44 Admin. Code 750. APPENDIX A – Equal Opportunity Clause, Rules and Regulations, Illinois Department of Human Rights, which read as follows:

"In the event of the contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the Rules and Regulations of the Illinois Department of Human Rights ("Department"), the contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be cancelled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation. During the performance to this contract, the contractor agrees as follows:

1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizen status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.
2. That, if he or she hires additional employees in order to perform this contract or any portion of this contract, he or she will determine the availability (in accordance with the Department's Rules and Regulations) of minorities and women in the areas from which he or she may reasonably recruit and he or she will hire for each job classification for which employees are hired in a way that minorities and women are not underutilized.
3. That, in all solicitations or advertisements for employees placed by him or her or on his or her behalf, he or she will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizenship status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service.
4. That he or she will send to each labor organization or representative of workers with which he or she has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligations under the Illinois Human Rights Act and the Department's Rules and Regulations. If any labor organization or representative fails or refuses to cooperate with the contractor in his or her efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Department and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations under the contract.
5. That he or she will submit reports as required by the Department's Rules and Regulations, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and the Departments Rules and Regulations.
6. That he or she will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules and Regulations.
7. That he or she will include verbatim or by reference the provisions of this clause in every subcontract awarded under which any portion of the contract obligations are undertaken or assumed, so that the provisions will be binding upon the subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply with the provisions. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

(Source: Amended at 32 I11. Reg. 16484, effective September 23, 2008)"

IL Dept of Human Rights Registration No.: _____ Expiration Date: _____

Signature

Subscribed and sworn to before me this _____ day of _____, 20_____.

Notary Public

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Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we:

_____ (hereinafter called the Principal) and

_____ (hereinafter called the Surety)

a Corporation chartered and existing under the laws of the State of _____ with its principal offices in the City of _____ and authorized to do business in the State of Illinois are held and firmly bound onto the Rock River Water Reclamation District of Winnebago County, Illinois (District), in the full and just sum of: **TEN PERCENT (10%) OF THE TOTAL BID PRICE** good lawful money of the United States of America, to be paid upon demand of the District, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally and firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted to the District, a proposal for constructing Sanitary Sewers and Appurtenances.

WHEREAS, the Principal desires to file this bond, in accordance with law, to accompany this Proposal.

NOW THEREFORE, The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within ten days after the date of receipt of a written notice of award of Contract, execute a Contract in accordance with the Proposal and upon the terms, conditions, and prices set forth therein, in the form and manner required by the District, and execute a sufficient and satisfactory Contract Performance Bond payable to said District in an amount of one hundred percent (100%) of the Contract price (including alternates) in form and with security satisfactory to said District, then this obligation to be void, otherwise to be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid District, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20_____.

Principal

(Seal)

By _____

Name: _____

Title: _____

Date: _____

Attest:

Secretary

Surety

(Seal)

By _____

Name: _____

Title: _____

Date: _____

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Agreement

1. General

THIS AGREEMENT, made and concluded this ____ day of _____, 2019, between the Rock River Water Reclamation District, Rockford, Illinois (District), acting by and through the Board of Trustees, and _____, his/their executors, administrators, successors or assigns:

2. Scope of Work

WITNESSETH: That for and in consideration of the payments and agreements made in the Proposal attached hereto, to be made and performed by the District and according to the terms expressed in the Bond referring to these presents, the Contractor agrees with the District at his/their own proper cost and expense to do all the work, furnish all equipment, materials and all labor necessary to complete the work in accordance with the plans and specifications hereinafter described, and in full compliance with all of the terms of this agreement and the requirements of the District and its representative.

And it is also understood and agreed that the Bidding Requirements, Detailed Specifications, Contract Forms, General Conditions, General Requirements, Technical Specifications, Plans, Addenda, and provisions required by law are all essential documents of the contract, and are a part hereof, as if herein set out verbatim or as if attached, except for titles, subtitles, headings, table of contents and portions specifically excluded.

3. Contract Price

The District shall pay to the Contractor, and the Contractor shall accept, in full payment for the performance of this Contract, subject to any additions or deductions provided for hereby, in current funds, the Total Contract Price of _____ and 00/100 (\$_____).

Payments are to be made to the Contractor in accordance with and subject to the provisions of Section 7 of this Agreement, which is a part of this Contract.

4. Bond

The Contractor has entered into and herewith tenders a bond of even date herewith, in the penal sum of _____ and 00/100 (\$_____) to insure the faithful performance of this Contract, which said bond is hereby made a part of this Contract by reference.

5. Maintenance and Guarantee

The Contractor shall promptly repair, replace, restore or rebuild any imperfections that may arise and shall maintain satisfactory to the District all work for a period three years from the date of final acceptance of the Contract for trench settlement and for a period of two years all other work, except where periods of maintenance and guarantee are provided for. The Contractor shall, for this

period, indemnify and save harmless the District, its officers and agents from any injury done to property or persons as a direct or alleged result of imperfections in the Contractors' work, and shall immediately assume and take charge of the defense of such action or suits in like manner and to all intents and purposes as if said actions and suits had been brought directly against the Contractor.

If the Contractor shall fail to repair, replace, rebuild or restore such defective or damaged work promptly after receiving notice given by the District, the District shall have the right to have the work done by others and to call on the Contractor and his bondsman to pay the costs thereof.

6. Contract Execution

IT IS EXPRESSLY UNDERSTOOD AND AGREED that the entire improvement shall be done in a thorough and workmanlike manner, under the direction and to the satisfaction of the District and in full compliance with all the requirements of its representative under them. All loss or damage arising out of the nature of the work to be done, or from any detention of unforeseen obstruction or difficulty which may be encountered in the prosecution of the work, or from the action of the elements, shall be sustained by the Contractor.

The Contractor will be held responsible for all accidents, and hereby agrees to indemnify and protect the District from all suits, claims, and actions brought against it, and all cost, and damages which the District may be put to by reason of an injury or alleged injury, to the person or property of another in the execution of this contract, or the performance of the work, or in guarding the same, or for any material used in its prosecution or in its construction.

Any person employed on the work who shall refuse or neglect to obey the directions of the District or its representative, or who shall be deemed by the District to be incompetent, or who shall be guilty of any disorderly conduct, or who shall commit any trespass on any public or private property in the vicinity of the work, shall at once be removed from the work by the Contractor when so requested by the District.

Any request to extend the contract completion date must be considered by the Board at the Board meeting prior to the then-existing contract termination date. Any deviation from this action will result in the liquidated damage clause in the contract to be exercised.

7. Payments to Contractor

The District hereby covenants and agrees, in consideration of the covenants and agreements in this Contract, specified to be kept and performed by the Contractor and subject to the conditions herein contained, and if the District receives an acceptable invoice prior to the tenth day of the month and receives approval of the work by the District Engineering Manager, the District shall issue payment before the fifth day of the succeeding month. If the District receives an acceptable invoice on or after the tenth day of the month, the District shall issue payment before the fifth day of the second succeeding month.

The District reserves the right at all times to refuse to issue payment in case the Contractor has neglected or failed to pay any subcontractors, workmen or employee on the work.

8. Subcontracts

No part of the work herein provided for shall be sublet or subcontracted without the express consent of the District, to be entered in the records, and in no case shall consent relieve the Contractor from the obligation herein entered into, or change the terms of this Agreement.

9. Contractor's Responsibility

This Contract shall extend to and be binding upon the successors and assigns, and upon the heirs, administrators, executors, and legal representatives of the Contractor.

In consideration of and to induce the award of this Contract to him, the Contractor represents and warrants: that he is not in arrears to the District upon debt of the Contract and that he is not a defaulter, as surety, contractor or otherwise; that he is financially solvent and sufficiently experienced and competent to perform the work; that the work can be performed as called for by the Contract; that the facts stated in his proposal and the information given by him is true and correct in all respects, and that he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be furnished for the completion of this Contract and that his information was secured by personal investigation and research.

The Contractor shall pay not less than the prevailing wage rate as determined by the Department of Labor, to all laborers, workmen and mechanics performing work under this Contract. Contractor shall comply with current revisions of the wage standards; as required by law. The Contractor shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (Form SBE 348).

In regard to nondiscrimination in employment, Contractor will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations as provided herein.

The Contractor shall comply with the American Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify the District and their representatives from all:

- (a) suits, claims, or actions;
- (b) costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement, and;
- (c) damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

Contractor shall also comply with Public Act 99-0933, which requires any party to a contract to adopt and enforce a written policy regarding sexual harassment that includes, as a minimum, the following information:

- (a) the illegality of sexual harassment
- (b) the definition of sexual harassment under Illinois State law;
- (c) a description of sexual harassment, utilizing examples;
- (d) my (our) organization's internal complaint process including penalties;
- (e) through the Illinois Department of Human Rights and the Illinois Human Rights Commission;

- (f) directions on how to contact the Department and the Commission; and
- (g) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

Upon request this information will be provided to the Illinois Department of Human Rights. Upon District award of a contract, the District will be provided this information described no more than ten working days after the District issues its award notification.

The Contractor shall comply with Article 2 of Public Act 83-1472 which provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State of Illinois as defined in the Act; and further, that Illinois workers are available and capable of performing the particular type work involved.

The Contractor shall comply with all rules and regulations of OSHA during the execution of this Contract.

The Contractor shall comply with the Federal Drug Free Workplace Act.

The Steel Products Procurement Act, Illinois Public Act 83-1030, requires that steel products used or supplied in performance of this Contract or subcontract shall be manufactured or produced in the United States with three exceptions, as explained in the Instructions to Bidders.

The Contractor shall comply with Public Act 96-1416 regarding the disposal of CCDD and uncontaminated soil at CCDD fill sites as explained in the Instructions to Bidders.

10. Time

Work under this Agreement shall be commenced upon written Notice to Proceed. The completion date for this project shall be December 1, 2019.

11. Liquidated Damages

The amount of liquidated damages shall be \$300.00 per calendar day.

12. Counterparts

This Agreement may be executed and recorded in counterparts, each of which shall be deemed an original and all of which, when taken together, shall constitute one and the same instrument. The Parties hereby acknowledge and agree that facsimile signatures or signatures transmitted by electronic mail in so-called "pdf" format shall be legal and binding and shall have the same full force and effect as if an original of this Agreement had been delivered. Each of the parties (a) intend to be bound by the signatures on any document sent by facsimile or electronic mail, (b) are aware that the other party will rely on such signatures, and (c) hereby waive any defenses to the enforcement of the terms of this Agreement based on the foregoing forms of signature.

13. Seals

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, and such of them as are corporations have caused these presents to be signed by their duly authorized officers.

**Rock River Water Reclamation District
Winnebago County, Illinois**

(Seal)

By _____
President, Board of Trustees

ATTEST: _____
Clerk of the Board

Contractor

(Corporate Seal)

By _____
Contractor's Officer

Name: _____

Title: _____

Date: _____

ATTEST: _____

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Performance Bond

KNOW ALL MEN BY THESE PRESENTS, that WHEREAS, the Rock River Water Reclamation District has awarded to: _____ hereinafter designated as the “Principal”, a contract, dated, _____, for the Rock River Water Reclamation District.

WHEREAS, said Principal is required under the terms of said Contract to furnish a bond for the faithful performance of said Contract (the “Bond”);

NOW, THEREFORE, we the Principal and _____, as Surety, are firmly bound unto the Rock River Water Reclamation District in the penal sum of _____ Dollars (\$ _____) lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents for a performance bond. The conditions of this obligation is such that if the said Principal does well and faithfully performs all the conditions and covenants of said Contract, according to the true intent and meaning thereof, upon its part to be kept and performed, then the above obligation is to be null and void, otherwise to remain in full force and effect.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Contract, including the provisions for liquidated damages in the said Contract, any changes, additions or alterations thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Rock River Water Reclamation District, its officers and agents, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same and no inadvertent overpayment of progress payments shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the specifications or of any inadvertent overpayment of progress payments. The Rock River Water Reclamation District shall be named as beneficiary on this Performance Bond.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their seal this _____ day of _____, 20_____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR

SURETY

Contractor Firm Name: _____

By: _____

By: _____ Signature

Attorney-in-Fact

Title

Resident Agent

ATTEST:

Corporate Secretary (Corporations only)

Not to be used for bidding purposes

Labor & Material Payment Bond

TO: _____ Contractor Name
_____ Contractor City, State

KNOW ALL MEN BY THESE PRESENTS

That _____ (Contractor)

as Principal, and _____

a corporation of the State of _____ as Surety, are held and firmly bound unto the Rock River Water Reclamation District, as Obligee, for the use and benefit of claimants as hereinafter defined in the amount of

_____ Dollars (\$ _____), for the payment where of Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____ 20____ Entered into a Contract with Obligee for _____ in accordance with contract documents prepared by the Rock River Water Reclamation District which Contract is by reference made a part hereof, and is hereinafter referred to as "the Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Principal shall promptly pay for all laborers, workers and mechanics engaged in the work under the Contract, and not less than the general prevailing rate of hourly wages of a similar character in the locality in which the work is performed, as determined by the State of Illinois Department of Labor pursuant to the Illinois Compiled Statutes 280 ILCS 130 / 1-12 et.seq. and for all material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect.

1. A claimant is deemed as any person, firm, or corporation having contracts with the Principal or with any of Principal's subcontractors for labor or materials furnished in the performance of the Contract on account of which this Bond is given.
2. Nothing in this Bond contained shall be taken to make the Obligee liable to any subcontractor, material man or laborer, or to any other person to any greater extent than it would have been liable prior to the enactment of The Public Construction Bond Act, approved June 20, 1931, as amended; provided further, that any person having a claim for labor and materials furnished in the performance of the Contract shall have no right of action unless he shall have filed a verified notice of such claim with the Obligee within 180 days after the date of the last item of work or the furnishing of the last item of materials, which claim shall have been verified and shall contain the name and address of the claimant, the business address of the claimant within the State of Illinois, if any, or if the claimant be a foreign corporation having no place of business within the State the principal place of

business of the corporation, and in all cases of partnership the names and residences of each of the partners, the name of the Contractor for the Oblige, the name of the person, firm or corporation by whom the claimant was employed or to whom such claimant furnished materials, the amount of the claim and a brief description of the public improvement for the construction or installation of which the contract is to be performed. No defect in the notice herein provided for shall deprive the claimant of its right of action under the terms and provisions of this Bond unless it shall affirmatively appear that such defect has prejudiced the rights of an interested party asserting the same.

3. No action shall be brought on this Bond until the expiration of 120 days after the date of the last item of work or of the furnishing of the last item of material except in cases where the final settlement between Oblige and the Contractor shall have been made prior to the expiration of the 120 day period, in which case action may be taken immediately following such final settlement; nor shall any action of any kind be brought later than 6 months after the acceptance by the Oblige of the work. Such suit shall be brought only in the circuit court of this State in the judicial district in which the Contract is to be performed.
4. Surety hereby waives notice of any changes in the Contract, including extensions of time for the performance thereof.
5. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.
6. The Principal and Surety shall be liable for any attorneys fees, engineering costs, or court costs incurred by the Oblige relative to claims made against this Bond.

Signed and Sealed this _____ day of _____, 2019.

CONTRACTOR SURETY
Contractor Firm Name

By: _____
Signature

By: _____
Attorney-in-Fact

Title Resident Agent

ATTEST:

Corporate Secretary (Corporations only)

Substation 3-6 Electrical Upgrades

Capital Project No. 2023

Section III

**EJCDC C-700 General Conditions and
Supplementary Conditions**

**Rock River Water Reclamation District
Rockford, Illinois**

Not to be used for bidding purposes

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC

AMERICAN COUNCIL OF ENGINEERING COMPANIES



ASCE American Society
of Civil Engineers

P/E National Society of
Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

Not to be used for bidding purposes

STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT

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Not to be used for bidding purposes

DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other

professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price

or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such

notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 Certificates of Insurance

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of

insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
5. allow for partial utilization of the Work by Owner;
6. include testing and startup; and
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery

against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work. Contractor shall restrict all activities related to the performance of the Work to the area indicated on the project drawings.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and

- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or

other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all

court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 Use of Site and Other Areas

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor

shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

- a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop

Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 6. any inspection, test, or approval by others; or
 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor,

Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits

and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The

opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on

Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor,

then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and

equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the

Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or

- b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
- c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
- d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
- e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

- 1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or

- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities

pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 80 00 – SUPPLEMENTARY CONDITIONS

SCOPE. THESE SUPPLEMENTARY CONDITIONS AMEND OR SUPPLEMENT THE GENERAL CONDITIONS AND OTHER PROVISIONS OF THE CONTRACT DOCUMENTS AS INDICATED HEREIN. ALL PROVISIONS WHICH ARE NOT SO AMENDED OR SUPPLEMENTED REMAIN IN FULL FORCE AND EFFECT.

SC-1. DEFINITIONS AND TERMINOLOGY.

SC-1.01. Defined Terms.

- A. Delete and replace definitions 9, 15, 17, 22, 23, 29, and 51 in Paragraph 1.01.A of the General Conditions with the following:

9. Change Order—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

15. Contractor—The individual or entity with whom Owner has entered into Agreement. The terms Contractor and CONTRACTOR are interchangeable and shall have the same meaning in the Contract Documents.

17. Drawings—That part of the Contract Documents prepared or approved by Consulting engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor Submittals are not Drawings as so defined. The terms Drawings and Plans are interchangeable and shall have the same meaning in the Contract Documents.

19. Engineer—The terms Engineer and ENGINEER are interchangeable and shall refer to the Engineering Manager of the Rock River Water Reclamation District.

22. Hazardous Environmental Condition—The presence at the Site of hazardous materials or conditions, including, but not limited to Contaminated Environmental Media, Asbestos, Metal Bearing Protective Coatings, Paints, and Linings, PCBs, Petroleum, Hazardous Waste, Radioactive Materials, metals such as but not limited to arsenic, cadmium, chrome, cobalt, lead, and mercury, and other Hazardous Substances; in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto or cause them to come under the application of a federal, state, or local regulation.

23. Hazardous Waste—The term Hazardous Waste shall have the meaning provided in 40 CFR 261 titled "Identification and Listing of Hazardous Waste," as amended from time to time.

29. Owner—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The terms Owner and OWNER and District are interchangeable and shall have the same meaning in the Contract Documents.

51. Work Change Directive—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner ordering an addition, deletion, or revision in the Work or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A

Work Change Directive will not change the Contract Price or the Contracts Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

B. Add the following definitions to Paragraph 1.01.A of the General Conditions:

52. Consulting Engineer—The firm of Systems Design Service Engineering, 3600 East State Street, Suite 215, Rockford, IL 61108 and their duly authorized agents, such agents acting within the scope of the particular duties entrusted to them in each case.

53. Float—The amount of time between the early start date and the late start date, or early finish date and late finish date, of any of the activities in the progress schedule.

54. Proposal—The terms “Proposal” and “Bid” are interchangeable and shall have the same meaning in the Contract Documents.

55. Resident Project Representative—In lieu of the definition set forth in Paragraph 1.01.A.36 of the General Conditions, the Resident Project Representative shall be the authorized representative or Owner, who may be assigned to the site or any part thereof.

56. without exception—The term “without exception,” when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment, product, or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or “or-equal” item and no substitution will be permitted.

57. Hazardous Substances—The term Hazardous Substances shall have the meaning provided in 29 CRF 1910.120 titled “Hazardous Waste Operations and Emergency Response,” as amended from time to time.

58. Metal Bearing Protective Coatings, Paints, and Liners—Protective coatings, paints, and liners that contain measurable amounts of metals such as but not limited to arsenic, cadmium, chrome, cobalt, lead, or mercury.

59. Contaminated Environmental Media—Soil, sediment, ground water, or air contaminated with Hazardous Substances.

SC-2. PRELIMINARY MATTERS.

SC-2.02. Copies of Documents. Delete Paragraph 2.02.A of the General Conditions, and replace it with the following new paragraph:

A. The contractor to whom a contract is awarded will be furnished, free of charge, 3 copies of the Project Manual and 3 sets of the Drawings, together with all Addenda. Additional copies of the Project Manual and Drawings may be obtained from Owner on the following basis:

Full Set of Drawings and Project Manual	\$50.00
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SC-3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE.

SC-3.05. Reuse of Documents. Delete Paragraphs 3.05.A of the General Conditions and replace it with the following:

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Consulting Engineer or its consultants, including electronic media editions; or
 - 2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Consulting Engineer or his consultants and specific written verification or adaption by entity responsibility for those documents.

SC-3.06. Electronic Data. Delete Paragraph 3.06.A of the General Conditions and replace it with the following:

- A. Except as permitted in the Submittals Procedures section of Division 1 data furnished by Owner, Engineer, or Consulting Engineer to Contractor, or by Contractor to Owner, Engineer, or Consulting Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

SC-4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS.

SC-4.02. Subsurface and Physical Conditions.

- A. Reports and Drawings. Delete Paragraph 4.02.A of the General Conditions and replace it with the following:
 - A. Reports and Drawings:
 - 1. No reports of explorations and tests of subsurface conditions at or contiguous to the Site were performed for this project.
 - B. Limited Reliance by Contractor on Technical Data Authorized. Delete Paragraph 4.02.B of the General Conditions in its entirety and replace it with the following paragraph:
 - B. No Reliance by Contractor Authorized. Owner, Consulting Engineer, and Engineer do not warrant the accuracy of the physical conditions information and drawings which are not Contract Documents. Contractor uses such information at Contractor's sole risk.

It shall be understood that the information provided is not guaranteed by Owner, Consulting Engineer, Engineer to be more than a general indication of the physical conditions likely to be found.

SC-4.04. Underground Facilities.

- A. Shown or Indicated. Delete Paragraph 4.04.A of the General Conditions in its entirety and replace with the following:
- A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Consulting Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
1. Owner and Consulting Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 2. The cost of all of the following shall be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data:
 - b. locating all Underground Facilities shown or indicated in the Contract Documents:
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction: and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.
- B. Not Shown or Indicated. Delete Paragraph 4.04.B of the General Conditions in its entirety and replace it with the following:
- B. Not Shown or Indicated:
1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner. Owner will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
 2. If owner concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of

an could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of such adjustment in the Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

SC-4.06. Hazardous Environmental Condition at Site.

- A. DELETE PARAGRAPH 4.06.A OF THE GENERAL CONDITIONS AND REPLACE WITH THE FOLLOWING PARAGRAPH:
- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to the Owner.
- B. Delete Paragraph 4.06.B of the General Conditions in its entirety.
- C. Delete Paragraph 4.06.G and 4.06.H of the General Conditions and replace with the following:
- G. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Consulting Engineer, Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- D. Renumber Paragraph 4.06.I of the General Conditions as Paragraph 4.06.H.
- E. Add the following new Paragraph immediately after Paragraph 4.06.H of the General Conditions as renumbered above:
- I. Abatement of Hazardous Environmental Conditions at the Site is covered in the Project Requirements section.

SC-5. BONDS AND INSURANCE. DELETE ARTICLE 5 OF THE GENERAL CONDITIONS IN ITS ENTIRETY, AND INSERT THE FOLLOWING TEXT IN ITS PLACE:

ARTICLE 5 – BONDS AND INSURANCE

Bonds and Insurance requirements shall be as identified in Instructions To Bidders.

SC-6. CONTRACTOR'S RESPONSIBILITIES.

SC-6.02. Labor; Working Hours. Add the following new paragraphs immediately after Paragraph 6.02.B of the General Conditions:

- C. No work shall be done between 4:00 PM and 6:30 AM except when power restoration is required or directed by the owner. Any work on outside of working hours or on Owner holidays requires Owner approval at least two (2) business days

in advance of the proposed extended work hours. However, emergency work may be done without prior permission.

SC-6.06. Concerning Subcontractors, Suppliers, and Others. Delete Paragraph 6.06.B of the General Conditions in its entirety and insert the following two paragraphs in its place:

- B. The Bidding Documents or the Contract Documents require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner with the Proposal, and if Contractor has submitted a list of thereof in accordance with the Bidding Documents or the Contract Documents, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

Particular consideration will be given to the qualifications of each Subcontractor proposed on the List of Subcontractors. The use of Subcontractors proposed by Bidder and accepted by Owner prior to the Notice of Award will be required in the performance of the Work unless otherwise permitted or directed by Owner.

SC-6.07. Patent Fees and Royalties. Delete Paragraph 6.07.B of the General Conditions in its entirety, and renumber paragraph 6.07.C as paragraph 6.07.B. Add the following new paragraph immediately after Paragraph 6.07.B of the General Conditions:

- C. Contractor shall furnish to Owner at the time of initial submittal, satisfactory evidence that Suppliers of proprietary materials, equipment, devices, or processes to be furnished or used in the performance of the Work do indemnify, keep, and save harmless Contractor from all liabilities, judgments, costs, damages, and expenses which may arise from the use of such proprietary materials, equipment, devices, or processes, furnished to Contractor for incorporation in or use in performance of the Work and their operation by Owner after acceptance of the Work. Such satisfactory evidence shall consist of patent licenses or patent releases covering proprietary materials, equipment, devices, or processes.

SC-6.09. Laws and Regulations. Add the following new paragraphs immediately after Paragraph 6.09.C of the General Conditions:

- D. The Contractor shall plan, schedule, and coordinate work in consideration of Owner's safety requirements, including but not limited to personal protective equipment for arc flash.
- E. Additional laws and regulations are included in the Instructions To Bidders.

SC-6.10. Taxes. Add the following new paragraph immediately after Paragraph 6.10.A of the General Conditions:

- B. Pursuant to Department of Revenue, Illinois Retailer's Occupation Tax Rule 15(4), sales of materials for incorporation into Owner's real estate are exempt from retailer's occupation tax and use tax. However, sales of tools, fuel, lumber for forms, and other end use or consumption items which are not incorporated into Owner's real estate are taxable sales.

SC-6.17. Shop Drawings and Samples. Delete Paragraph 6.17 of the General Conditions in its entirety and replace it with the following:

6.17. Shop Drawings and Samples. Requirements for shop drawings, samples, and submittal procedures shall be as specified in Division 1 Submittals Procedures section. Fabrication that proceeds prior to acceptance of submittals by Engineer shall be at Contractor's Risk.

SC-6.19. Contractor's General Warranty and Guarantee. Delete Paragraphs 6.19.C.6 and 6.19.C.7 of the General Conditions and replace with the following Paragraphs 6.19.C.6, 6.19.C.7, and 6.19.C.8.

6. an inspection, test, or approval by others;
7. any correction of defective Work by Owner; or
8. any expiration of a correction period.

SC-6.20. Indemnification. Delete Paragraph 6.20 of the General Conditions in its entirety and replace it with the following:

6.20. Indemnification - Indemnification shall be as indicated in Instructions To Bidders.

SC-6.21. Delegation of Professional Design Services.

- B. Delete Paragraphs 6.21.B, 6.21.C, and 6.21.D of the General Conditions in their entirety, and replace with the following Paragraphs 6.21.B, 6.21.C, and 6.21.D.
 - B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by an Illinois Licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Owner.
 - C. Owner shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications or approval performed by such design professionals, provided Owner has specified to Contractor all performance and design criteria that such services must satisfy.
 - D. Pursuant to this Paragraph 6.21, Owner's review and acceptance of signed and sealed certifications of performance and design criteria used when designating systems, materials, or equipment and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Owner's review and acceptance of Shop Drawings and other submittals (except performance and design criteria and design drawings) will be only for the purpose stated in Division 1 Submittals Procedures section.
 - E.

SC-8. OWNER'S RESPONSIBILITIES.

SC-8.01. Communications to Contractor. Delete Paragraph 8.01.A of the General Conditions in its entirety, and replace it with the following:

- A. Except as otherwise provided in these General Conditions, Owner will issue communications to Contractor.

SC-8.11. Evidence of Financial Arrangements. Delete Paragraph 8.11 of the General Conditions in its entirety, and replace it with the following:

- 8.11. Evidence of Financial Arrangements. – Not Used.

SC-9. ENGINEER'S STATUS DURING CONSTRUCTION.

SC-9.08. Decisions on Requirements of Contract Documents and Acceptability of Work.

- A. Add the following new words at the end of the first sentence of Paragraph 9.08.A of the General Conditions.

...insofar as the subject matter of any pertinent claim, dispute, or other matter falls within the realm of the technical expertise of Engineer.

- B. Add the following new sentence at the end of Paragraph 9.08.A of the General Conditions:

Engineer shall not render any decision on any claims, disputes, or other matters the subject matter of which, at Engineer's sole discretion, requires legal, rather than technical, interpretation.

- C. Delete 9.08.C in its entirety

SC-10. CHANGES IN THE WORK; CLAIMS.

SC-10.03. Execution of Change Orders.

- A. Replace the first sentence of Paragraph 10.03.A of the General Conditions with the following:

Owner and Contractor shall execute appropriate Change Orders covering:

- B. Delete Paragraph 10.03.A in its entirety.

SC-10.05. Claims.

- A. Delete Paragraph 10.05.B of the General Conditions in its entirety, and replace with the following.

- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 7 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 14 days after the start of such event (unless Engineer allows additional

time for claimant to submit additional or more accurate data in support of such Claim). A claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 7 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

B. Delete Paragraph 10.05.E of the General Conditions in its entirety, and replace with the following:

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Contractor appeals to the Owner's Board of Trustees within 30 days of such action or denial. All other disputes will be settled by the remedies at law.

SC-11. COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK. – NO MODIFICATIONS.

SC-12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES. – NO MODIFICATIONS.

SC-13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK.

SC-13.07. Correction Period. Add the following new paragraphs immediately after Paragraph 13.07.E of the General Conditions:

F. Nothing in this Article 13 concerning the correction period shall establish a period of limitation with respect to any other obligation which Contractor has under the Contract Documents. The establishment of time periods relates only to the specific obligations of Contractor to correct the Work, and has no relationship to the time within which Contractor's obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than to specifically correct the Work.

G. The correct period set forth in Paragraph 13.07.A shall be 2 years in lieu of 1 year. All other provisions of Paragraph 13.07 shall remain unchanged.

SC-14. PAYMENTS TO CONTRACTOR AND COMPLETION.

SC-14.02. Progress Payments. Add the following new paragraphs immediately following Paragraph 14.02.A.3 of the General Conditions:

4. Materials and Equipment. Payments for stored materials and equipment shall be based only upon the actual cost to Contractor of the materials and equipment and shall not include any overhead or profit to Contractor.

Partial Payments will not be made for undelivered materials or equipment.

5. Schedule and Data. During the progress of the Work, each application for Payment shall be accompanied by Contractor's updated schedule of operations or progress report, with such shop drawings schedules, procurement schedules, values of materials and equipment on hand included in application, and other data specified or reasonably required by Engineer.
6. Lien Waivers. Each application for payment shall be accompanied by lien waivers.

SC-14.07. Final Payment. Add the following new sentence at the end of Paragraph 14.07.A.2 of the General Conditions:

Consent of the surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the surety.

SC-15. SUSPENSION OF WORK AND TERMINATION. No Modifications.

SC-16. DISPUTE RESOLUTION. Delete Article 16 of the General Conditions in its entirety, and insert the following text in its place:

ARTICLE 16 – NOT USED

SC-17. MISCELLANEOUS. No Modifications.

SC-17.04. Survival of Obligations. Add the following new paragraph immediately after Paragraph 17.04.A of the General Conditions:

- B. Contractor shall obtain from all Suppliers and manufacturers any and all warranties and guarantees of such Suppliers and manufacturers, whether or not specifically required by the Specifications, and shall assign such warranties and guarantees to Owner. With respect thereto, Contractor shall render reasonable assistance to Owner when requested, in order to enable Owner to enforce such warranties and guarantees. The assignment of any warranties or guarantees shall not affect the correction period or any other provisions of these Contract Documents.

END OF SECTION 00 08 00

Substation 3-6 Electrical Upgrades

Capital Project No. 2023

Section IV

**General Provisions and Technical
Specifications for Sanitary Sewer Construction
(separate document incorporated by reference)**

**Rock River Water Reclamation District
Rockford, Illinois**

Not to be used for bidding purposes