

WPCD G1 BP07 Generator Replacement

City of Wheeling, WV

Funding from Bond Package 2025, Amendment 4

October 2026

0000038010PH2



8150 Sterling Ct. | Mentor | OH | 44060 |
440.951.9000 | www.verdantas.com

CITY OF WHEELING OFFICIALS

ADMINISTRATION

Denny Magruder, Mayor

Robert Herron, City Manager

William Lanham, Assistant City Manager

Chelsea Brown, Administrative Assistant

Nathan Greene, Finance Director

David Pesi, Utility Accounting

Marci Embrey, Water Billing/Accounting

Rosemary Humway-Warmuth, City Solicitor

Travis Workman, Interim City Engineer

Mike Chiazza, Water Pollution Control Plant Superintendent

Lori Siburt, Water Department Superintendent

COUNCIL

Tony Assaro, Ward 1

Ben Seidler, Ward 2

Connie Cain, Ward 3

Jerry Sklavounakis, Ward 4

Ty Thorngate, Ward 5

Dave Palmer, Ward 6

Jessica Holloway, City Clerk

ADVERTISEMENT FOR BIDS/PUBLIC NOTICE TO BIDDERS

Sealed bids will be received by the City of Wheeling, WV at the office of the City Manager, 1500 Chapline Street, 3rd Floor, Wheeling, WV 26003 until 2:30 p.m. October 22, 2026 and will be opened and read immediately thereafter for the

WPCD G1 BP07 GENERATOR REPLACEMENT

FUNDING FROM BOND PACKAGE 2025, AMENDMENT 4

COMPLETION DATE: APRIL 26, 2027

The bid specifications, drawings, plan holders list, addenda, and other bid information (**but not the bid forms**) may be viewed and/or downloaded for free via the internet at <https://bids.verdantas.com>. The bidder shall be responsible to check for Addenda and obtain same from the web site.

Bids must be in accordance with drawings and specifications and on forms available from Verdantas LLC at a non-refundable cost of One Hundred Twenty-Five Dollars (\$125.00) for hard copies **and Forty-Five Dollars (\$45.00) for electronic files**. Documents may be ordered by registering and paying online at <https://bids.verdantas.com>. Please contact planroom@verdantas.com or call (440) 530-2351 if you encounter any problems viewing, registering, or paying for the documents.

There will be a Non-Mandatory Pre-Bid Conference on October 14, 2026 at 10:30 a.m. via a TEAMS only Meeting with walk-through digitally using TruView. See Section 6 - Specific Project Requirements of the Bid Book for information to join the Meeting.

All Bidders are required to have a West Virginia Contractor's License per Sections §21-11-11 of the West Virginia Code and it is to be included with the bid.

Publish: *The Intelligencer & Wheeling News-Register*
October 1, 2026
October 8, 2026

TABLE OF CONTENTS

	<u>Page No.</u>
Title Page	i
Officials Page	ii
Advertisement for Bids/Public Notice to Bidders	iii
Table of Contents	iv - vi
SECTION 1 <u>BID DOCUMENTS AND BID FORMS</u>	
Instructions to Bidders	BD.1 – BD.7
City Engineer Memorandum	BD.8
Prices to Include	BD.9
<u>**ALL BID FORMS SHALL BE COMPLETED AND SUBMITTED WITH BID**</u>	
Form of Non-collusion Affidavit	BF.1
Corporate Resolution	BF.2
Proposed Subcontractors	BF.3
Experience Record	BF.4
Statement of Bidder's Qualifications	BF.5 – BF.7
West Virginia Contractor License	BF.8
Certification of Non-Segregated Facilities	BF.9
Certification of Bidder Regarding EEO	BF.10
Drug-Free Workplace Affidavit	BF.11 – BF.12
Insurance Agent Affidavit	BF.13
Bid Security	BF.14
Proposal Forms	BF.15 – BF.16
SECTION 2 <u>CONTRACT FORMS</u>	
Notice of Award	CF.1
Contract and Certificates of Fiscal Officer & Legal Counsel	CF.2 - CF.3
Contract Bond, Certificates of Insurance & Worker's Comp.	CF.4
Certificate of Liability Insurance – Sample ACORD 25	CF.5
Supplemental Bond Acknowledgement	CF.6
Approved Subcontractors	CF.7
Notice to Proceed	CF.8
SECTION 3 <u>GENERAL CONDITIONS, EJCDC No. C-700 (2007)</u>	1 – 68
SECTION 4 <u>SUPPLEMENTARY CONDITIONS</u>	SC.1 - SC.10

SECTION 5 SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

011100	SUMMARY OF WORK
011419	USE OF SITE
011423	ADDITIONAL WORK, OVERTIME
012100	ALLOWANCES
013119	PROJECT MEETINGS
013233	PHOTOGRAPHIC DOCUMENTATION
013236	VIDEO MONITORING AND DOCUMENTATION
013323	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
013325	WARRANTY
013326	PRODUCT TESTING AND CERTIFYING
013326.01	QUALITY CONTROL PLAN
014223	INDUSTRY STANDARDS
014323	QUALIFICATIONS OF TRADESMEN
014523	EQUIPMENT TESTING AND FUNCTIONAL VERIFICATION
015213	FIELD OFFICES
016600	PRODUCT HANDLING AND PROTECTION
016617	MAINTENANCE
017517	STARTING AND COMMISSIONING
017800	FINAL COMPLIANCE AND SUBMITTAL
017821	CLEANING AND PROTECTION
017823	MAINTENANCE MANUALS
017839	PROJECT RECORDS, DRAWING
017901	OPERATIONAL DEMONSTRATION BY OWNER
017902	INSTRUCTION OF OWNER'S PERSONNEL
018000	SYSTEM PERFORMANCES

DIVISION 02 – EXISTING CONDITIONS

026500	REGULATED UNDERGROUND STORAGE TANK CLOSURE
--------	---

DIVISION 03 – CONCRETE

030000	CAST-IN-PLACE CONCRETE
--------	------------------------

DIVISION 26 – ELECTRICAL

260500	GENERAL PROVISIONS ELECTRICAL
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
260923	LIGHTING CONTROL DEVICES
262200	LOW-VOLTAGE TRANSFORMERS
262300	LOW-VOLTAGE SWITCHGEAR
262413	SWITCHBOARDS
262416	PANELBOARDS
262726	WIRING DEVICES
262813	FUSES
262816	ENCLOSED SWITCHES
262913	ENCLOSED CONTROLLERS
263213	ENGINE GENERATOR
263600	TRANSFER SWITCHES
265100	INTERIOR LIGHTING

DIVISION 33 – UTILITIES

330900	GENERATOR FUEL PUMP CONTROL PANEL
--------	-----------------------------------

Page No.

SECTION 6 SPECIFIC PROJECT REQUIREMENTS

SR.1 – SR.2

05/26

SECTION 1
BID DOCUMENTS

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

- 1.1 Sealed bids shall be received by the Owner at the location specified and until the time and date specified in the Advertisement for Bids/Public Notice to Bidders.
- 1.2 Each bid shall contain the full name and address of each person or company interested in said bid. If no other person be so interested, the Bidder shall distinctly so state the fact.
- 1.3 Bid forms must be completed in ink or by typewriter. Any corrections to the bid forms prior to submission must be initialed by the person signing the bid. Failure to submit any bid form(s) or other required document(s) may be cause for rejection of the bidder's bid at the sole discretion of the Owner.
- 1.4 Bids by Corporations must be executed in the corporate name by the President, Vice President, or other officer accompanied by evidence of authority to sign and the corporate seal must be affixed and attested by the Secretary on the Corporate Resolution form.
- 1.5 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature.
- 1.6 All names must be typed or printed below the signature.
- 1.7 The bid shall contain an acknowledgment of receipt of all Addenda.
- 1.8 If a Bidder wishes to withdraw his bid prior to the opening of bids, he shall state his purpose in writing to the Owner before the time fixed for the opening, and when reached it shall be handed to him unread.
- 1.9 After the opening of bids, no Bidder may withdraw his bid for a period of 90 days.

PART 2 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 2.1 Before submitting a bid, each Bidder must
 - A. Examine the Contract Documents thoroughly.
 - B. Visit the site to familiarize himself with local conditions that may in any manner affect cost, progress, or performance of the work.
 - C. Familiarize himself with Federal, State, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the work.
 - D. Study and carefully correlate Bidder's observations with the Contract Documents.

- 2.2 Reference is made to the Specific Project Requirements for the identification of any reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the work which have been relied upon by the Engineer in preparing the drawings and specifications. Owner will make copies of such reports available to any Bidder requesting them if not made available with the bid documents. These reports are not guaranteed as to accuracy or completeness; nor are they part of the Contract Documents. Before submitting his bid each Bidder will, at his own expense, make such additional investigations and tests as the Bidder may deem necessary to determine his bid for performance of the work in accordance with the time, price and other terms and conditions of the Contract Documents.
- 2.3 Upon request, the Owner will provide each Bidder access to the site to conduct such reasonable investigations and tests as each Bidder deems necessary for submission for his bid.
- 2.4 The lands upon which the work is to be performed, rights-of-way for access thereto, and other lands designated for use by Bidder in performing the work are identified on the Drawings.
- 2.5 The submission of a bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this section and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

PART 3 ESTIMATED QUANTITIES

- 3.1 In Unit Price Contracts, the quantities of the work itemized in the bid are approximate only and the bidders are hereby notified that the estimated quantities made by the Engineer are merely for the guidance of the Owner in comparing on a uniform basis all bids received for the work.
- 3.2 The contract quantities, where itemized, are based on plan horizontal and vertical dimensions unless otherwise specified. It is the Contractor's responsibility to verify and determine actual quantities of materials such as pipe, pavement, subgrade, etc. in his ordering materials.
- 3.3 Payments, except for lump sum contracts and except for lump sum items in unit price contracts, will be made to the Contractor only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the scheduled quantities of work to be done and materials to be furnished for items labeled as "Contingency" may be increased or diminished by any amount and the awarded quantity of all other items may be increased or diminished up to 15% without in any way invalidating the bid unit prices.
- 3.4 The successful Bidder will be required to furnish the Owner with a complete breakdown of the lump sum bid items, to the satisfaction of the Engineer/Architect, before signing the Contract documents.

PART 4 CONTRACTOR'S QUALIFICATION

- 4.1 Bidder shall provide detailed information relating to similar projects completed within the past 5 years which demonstrates the bidder's capability, responsibility, experience, skill, and financial standing to undertake this type of project and shall include a list of all projects currently under construction including status and contact person.
- 4.2 Bidder shall own, have rental or lease agreements for, or otherwise have readily available any and all equipment and tools necessary for proper execution of the work. The Owner reserves the right to request lists of equipment or tools available for the project including sources.
- 4.3 Bidder shall provide pertinent information to the Owner relative to any pending suits or outstanding liens. If no information is provided by the Bidder, the Owner shall assume that any such suits or liens do not exist.
- 4.4 The Owner may require similar information on any or all subcontractors proposed by the Bidder.

PART 5 SUBCONTRACTORS

- 5.1 The Owner reserves the right to limit the total amounts of subcontractors to 60% of the total contract price.
- 5.2 The Bidder shall state on the appropriate bid form the names of all Subcontractors proposed and the items of work they are to be assigned. All work not assigned to a Subcontractor shall be assumed by the Owner to be performed by the Bidder.
- 5.3 The Owner reserves the right to approve all subcontractors proposed by the Bidder. If the Owner, after due investigation, rejects the use of a proposed subcontractor, the apparent successful Bidder may either submit an acceptable substitution without increase in bid price or decline substitution and withdraw his bid without sacrificing his bid security. Any listed subcontractor to whom the Owner does not make written objection prior to award of contract, shall be deemed acceptable to the Owner.
- 5.4 Requests for changes of Subcontractor by the Bidder after the award shall be subject to the Owner's approval and shall not change the contract bid prices.
- 5.5 No contractor shall be required to employ any Subcontractor, person or organization against whom he has reasonable objection.

PART 6 BID REVIEW BY OWNER

- 6.1 The Owner reserves the right to reject any and all bids, to waive as an informality any and all irregularities, and to disregard all nonconforming, nonresponsive or conditional bids.

- 6.2 All extensions and totals of unit prices and quantities submitted as part of the bid shall be considered informal until verified by the Owner. All bids must be made on the forms contained herein and the bid prices must be written therein, in figures only. Unit prices shall be separately written for "Unit Price Labor," "Unit Price Material," and "Total Unit Price" for each item listed. Should an error in addition and/or multiplication be determined while checking the Contractor's math and verifying his total bid, the "Unit Price Labor" and the "Unit Price Material" figures shall govern in determining the correct "Total Unit Price" and the correct "Item Total."
- 6.3 Each bidder must bid on all Items, Alternates, Deductions, and Additions contained in the Bidding Forms. All bids not in conformity with this notice may be considered informal and may be rejected.
- 6.4 In evaluating bids, the Owner may consider:
- A. The qualifications and experience of the Bidder, proposed subcontractors, and principal material suppliers as outlined in the plans and specifications.
 - B. Financial ability and soundness of the Bidder and proposed subcontractors.
 - C. Completeness of all bid forms and bid requirements.
 - D. Alternates and unit prices requested in the Bid Forms.
 - E. Unit prices or schedules of values that are or appear to be unbalanced.
 - F. Previous contractual experience with the Owner.
 - G. Whether or not the bid package complies with the prescribed requirements.
 - H. The proposed completion date, if applicable.
 - I. Any other matter allowed by law or local ordinance or resolution.
- 6.5 Owner may conduct further investigations as he deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications, and financial ability of the Bidders, proposed Subcontractors, and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- 6.6 Owner reserves the right to reject the bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.
- 6.7 The Contract award shall be based on the lowest and best bid or lowest responsive and responsible bid (as applicable for the public contracting agency receiving bids) for the base bid and selected alternate items (if any) for this project.

PART 7 BID SECURITY

- 7.1 Each bid must be accompanied by bid security in the form of a certified or cashier's check or a bid bond in the amount of 5% of the amount bid including all alternates, if any. The certified or cashier's check shall be from a financial institution authorized to transact business in the State of West Virginia and acceptable to the Owner. The bond shall be underwritten by a Surety Company authorized to transact business in the State of West Virginia have an agent licensed to do business in West Virginia. The Surety Company shall be listed on the most current Department of the Treasury Circular 570, "Surety Companies Acceptable on Federal Bonds."
- 7.2 The certified or cashier's check or bid bond shall be made payable to the Owner and shall serve as a guarantee that in the event the bid is accepted and a contract is awarded to the successful Bidder, the contract will be executed by the bidder including any certifications, certificates or additional bonds required by the contract.
- 7.3 Failure on the part of the successful Bidder to execute the contract documents will cause the certified or cashier's check or bond to be forfeited to the Owner as damages.
- A. If the Owner awards the contract without rebidding, the Bidder (and the Surety on his bond if a bond was submitted) shall be liable to the Owner for a penal sum not to exceed the difference between the low bid and the next lowest bidder or 5% of the amount of the bid, whichever is less.
- B. If the Owner does not award the Contract to the next lowest Bidder, but resubmits the project for bidding; the Bidder (and the Surety on his bond if a bond was submitted) shall be liable to the Owner for a penal sum not to exceed the costs in connection with the resubmission of bids or 5% of the amount of the bid, whichever is less.
- 7.4 Checks for bid security of all bidders will be returned within seven days of the Effective Date of the Agreement.

PART 8 CONTRACT BOND / PERFORMANCE AND PAYMENT BOND

- 8.1 As security for faithful performance and payment of all obligations under the Contract, the Owner shall require and the successful Bidder shall furnish a Contract Bond AKA a Performance and Payment Bond in the amount of 100% of the awarded Contract Price. The Contractor and his Surety shall sign the Supplemental Bond Acknowledgement form and submit with the Contract forms.
- 8.2 The bond shall be underwritten by a Surety Company authorized to transact business in the State of West Virginia have an agent licensed to do business in West Virginia. The Surety Company shall be listed on the most current Department of the Treasury Circular 570, "Surety Companies Acceptable on Federal Bonds."
- 8.3 The contract bond shall cover correction of the work for the period stated in the specifications and the correction period shall start upon Final Acceptance of the entire project and final payment by the Owner.

The Awarded Contractor and his Surety shall sign the Supplemental Bond Acknowledgement form and submit it with the Contract (Performance and Payment) Bond.

- 8.4 Nothing in the performance of the Engineer's service to the Owner in connection with this project shall in any way imply any undertaking for the benefit of the successful Bidder, its subcontractor(s), or the surety of any of them.

PART 9 AWARD AND EXECUTION OF CONTRACT

- 9.1 After the Owner's legislative body awards the project, the successful bidder will receive the unsigned contract documents. Within 10 days after their receipt, the successful Bidder shall sign and deliver to the Owner said contract documents including any certifications, certificates, or additional bonds required by the contract.
- 9.2 The Owner shall execute the Contract within 90 days after the day of the bid opening. When necessary and by mutual consent between the Owner and the Successful Bidder, this 90-day period may be extended.
- 9.3 The date of the Owner's signature on the Contract Agreement shall be the effective contract date.
- 9.4 The Owner shall execute and deliver to the successful Bidder one set of fully executed contract documents.

PART 10 INSURANCE

- 10.1 Verification of limits for public liability, property damage, automobile, Worker's Compensation, or any other insurance required by the provisions of this Contract must be submitted to the Owner prior to execution of the Contract.
- 10.2 All insurance shall be endorsed so that it cannot be cancelled for non-payment of premium for 10 days or cancelled or non-renewed for any other reason in less than 30 days after a written notice of such proposed action by the insurer is given to the Owner. The cancellation clause on the Certificate(s) of Insurance shall read as specified in the Supplementary Conditions and failure to submit an insurance certificate or binder and/or policy endorsement verifying same shall be reason for the Owner to consider the Contractor non-responsive in complying with the requirements for contract execution and may be cause for forfeiture of the Bid Security to Owner.
- 10.3 The Contractor's Liability Insurance policy(s) shall be endorsed such that limits are on a Per Project basis.
- 10.4 The Contractor shall also provide an Owner's and Contractor's Protective Policy.

PART 11 NON-COLLUSION AFFIDAVIT

- 11.1 Each bid must be accompanied by a completed Noncollusion Affidavit provided within the contract documents.
- 11.2 Where there is reason to believe collusion or combination among bidders exists, the Owner reserves the right to reject the bid of those concerned.

PART 12 ORIGINAL DOCUMENTS

- 12.1 All bid forms, contract forms, bonds and any other bid documents or contract documents requiring signatures shall be submitted with original signatures. No photo copies or faxed copies of signed documents shall be accepted.

PART 13 ADDENDA

- 13.1 The bidder shall be responsible to obtain Addenda from the web at <https://bids.verdantas.com> .

END OF SECTION

06/25

CITY OF WHEELING



CITY COUNTY BUILDING
1500 CHAPLINE STREET
WHEELING, WEST VIRGINIA 26003

DEPARTMENT OF PUBLIC WORKS - ENGINEERING DIVISION
304.234.3731 Fax 304.234.3605 www.wheelingwv.gov

MEMORANDUM

TO: All Prospective Bidders
FROM: City Engineer

For your information, the following conditions are applicable for this project.

- 1) A City of Wheeling Contractor's License is required for the successful bidder. Cost is \$15.00 per year Beginning July 1st and will be prorated for less than one year if applicable.
- 2) A West Virginia Contractor's License is required at the time of bidding.
- 3) City of Wheeling contracting privilege tax is \$2.00 per \$100 of values (2%)
- 4) There is a City Service Fee of \$2.00 per week for individuals who work within the City of Wheeling. Copies of the regulations, documents, forms, etc. can be obtained from the City Finance Department or accessed online at wheelingwv.gov. Look in departments, finance, city service fee.
- 5) Tax releases from both City and State must be received before the release of the final payment will be made.
- 6) A 5% bid guaranty is required, see Instructions to Bidders in the contract documents.

If you have any questions concerning this information related to this project, please contact the Engineering Department at (304) 234-3731.

PRICES TO INCLUDE

PART 1 - GENERAL

Any work shown on the plans or required in the specifications but not paid for separately as a bid item shall be included in the cost of other bid items. The amount bid for each Bid Item shall include the following:

- 1.1 All labor, materials, tools, equipment, and transportation necessary for the proper execution of the work in accordance with the Contract Documents.
- 1.2 All assistance required by the Engineer to verify compliance with the Contract Documents, including measuring for final pay quantities.
- 1.3 Project coordination and scheduling.
- 1.4 Detailed breakdown of lump sum bid items as requested by the Engineer.
- 1.5 All provisions necessary to protect workmen, the general public, and property along the work in accordance with the Contract Documents.
- 1.6 Protection and/or replacement of existing property corner monuments.
- 1.7 Reimbursement to Owner for costs of re-inspection or re-testing of any work not installed in compliance with the Contract Documents.
- 1.8 Erosion control measures, as required to prevent the erosion of soil resulting from the work outlined in the project documents.
- 1.9 Pavement removal required for the installation of new pipe and removal of existing pipe.
- 1.10 Flap gates installed as part of the storm sewer system.
- 1.11 Outside drops for sanitary manhole.
- 1.12 Abandonment of existing sewers, bulkheads, blind connects, and masonry collars required for the installation of the proposed sewer.
- 1.13 All provisions required for connection of the proposed sewer system to an existing structure, including grout, sealants, coring, fittings, patching and reshaping of the existing flow channel.
- 1.14 Any locations on the plans where it is indicated to expose an existing utility, the cost for potholing, exposing, and excavation.
- 1.15 Bonds and Insurances (including "Owner/Contractor Protective Policy," "All Risk Builder's Risk Insurance," and/or "Installation Floater Insurance", and/or endorsements to fully comply with all contract requirements). See the Instructions to Bidders, Supplemental Conditions and Specific Project Requirements.

BID FORMS

The bid forms are not available online. The bid forms are available only by purchasing a set of plans and specifications at the location indicated in the Advertisement for Bids/Public Notice to Bidders.

SECTION 2
CONTRACT FORMS

NOTICE OF AWARD

TO: «ContractName»
«ContractAddr»
«ContractCity», «ContractState» «ContractZip»

PROJECT: «TitleCaps»

You are notified that your Bid which was opened on «Bidopening» has been accepted for items in the amount of «ContractDollars» at the unit bid prices as reflected in the bid tabulation contained herein for the ***(fill in awarded parts, i.e. for Base Bid and Alternate C, ... or delete).***

You are required by the Instructions to Bidders to execute the Agreement and furnish the required Bonds, Certificates of Insurance, and other documents within 10 calendar days from the date of receipt of this Notice.

Failure to comply with these conditions within the time specified will entitle Owner to consider your Bid in default, to annul this Notice and to declare your Bid Security forfeited.

The Owner will return to you one (1) fully signed set of the contract documents.

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

ACKNOWLEDGMENT

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

CONTRACT

FOR «TitleCaps»

THIS AGREEMENT, made and entered into at «OwnerCity», «OwnerState», this _____ day of _____, 20____, by and between the «OwnerMuni», «OwnerState» (“OWNER”), and «ContractName» (“CONTRACTOR”).

WITNESSETH: That the said CONTRACTOR has agreed and by this presents does agree with the OWNER for the consideration hereinafter mentioned and contained, and under penalty expressed in a bond given with these presents, and herein contained or hereunto annexed, to furnish at his own cost and expense, all the necessary tools, equipment, materials, labor, and tests in an expeditious, substantial and workmanlike manner, the equipment and appurtenances herein contemplated, commencing work within 20 days from the date of the Notice to Proceed and executing the work within the time and in the manner specified and in conformity with the requirements set forth in this Contract.

The following form essential parts of the Contract (may vary with project).

1. Advertisement for Bids/Public Notice to Bidders
2. Instruction to Bidders
3. Bid Forms and Proposal
4. Contract Forms and Exhibits
5. Contract Bond or Performance and Payment Bond
6. Contract Provisions
7. General Conditions
8. Supplementary Conditions
9. Specifications
10. Specific Project Requirements
11. Contract Drawings, if any

The CONTRACTOR agrees and understands that the work on this contract shall be subject to the acceptance of the OWNER based upon and in accordance with the contract specifications and contract plans and drawings on file in the office of the OWNER.

The CONTRACTOR shall proceed with the said work in a prompt and diligent manner and shall do the several parts thereof, at such times and in such order as the OWNER may direct. Further he shall complete the whole of said work in accordance with the specifications and contract drawings to the satisfaction of the OWNER on or before the time stated, and in default of completion within the time as fixed, the CONTRACTOR shall pay to the OWNER as liquidated damages, an amount equal to «Liquidated», for each and every day (Sundays and legal holidays excepted) the completion of the work may be delayed beyond the date fixed in the manner and as stipulated.

It is hereby mutually agreed that the OWNER is to pay and the CONTRACTOR is to receive, as full compensation for furnishing all materials and labor in building, constructing and testing and in all respect completing the herein described work and appurtenances in the manner and under the conditions herein specified, the prices stipulated in the proposal herein contained or hereto annexed and the total contract sum is «ContractDollars».

This Contract shall be in full force and effect from the date of execution by the parties.

IN WITNESS WHEREOF: The parties hereunto affixed their signature the day and year first mentioned above.

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

I hereby certify that funds in the amount of «ContractAmtwords» Dollars («ContractDollars») necessary for the foregoing Contract have been appropriated and are in the Treasury, or are in the process of collection, or are available through grants and/or loans from other funding sources.

«OwnerFiscalFirst» «OwnerFiscalLast», «OwnerFiscalTitle»

APPROVED AS TO FORM:

«OwnerLegalName», «OwnerLegalTitle»

**THE CONTRACTOR SHALL FURNISH THE FOLLOWING ITEMS
WITHIN 10 DAYS OF NOTIFICATION OF AWARD:**

- A) CERTIFICATE OF INSURANCE FOR
CONTRACTOR'S GENERAL LIABILITY INSURANCE POLICY
AND AUTOMOTIVE INSURANCE POLICY**

- B) CERTIFICATE OF INSURANCE FOR
OWNER'S AND CONTRACTOR'S PROTECTIVE POLICY**

- C) CERTIFICATE OF WORKER'S COMPENSATION**

- D) CONTRACT BOND OR PERFORMANCE AND PAYMENT BOND
(Made payable to the Owner)**

DATE (MM/DD/YYYY)

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must have **ADDITIONAL INSURED** provisions or be endorsed. If **SUBROGATION** IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER		CONTACT NAME:	
SAMPLE CERTIFICATE OF INSURANCE		PHONE	
		FAX	
		(A/C, No, Ext):	
		(A/C, No):	
		E-MAIL	
ADDRESS:			
		INSURER(S) AFFORDING COVERAGE	
		NAIC #	
INSURED		INSURER A :	
ABC Company Main Street Wheeling, WV 26003		INSURER B :	
		INSURER C :	
		INSURER D :	
		INSURER E :	
		INSURER F :	

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE		ADOL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF. (MM/DD/YYYY)	POLICY EXP. (MM/DD/YYYY)	LIMITS	
	☒	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	\$ 2000,000
	☐	CLAIMS-MADE ☒ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 1,000,000
	☒	XCU Included						MED EXP (Any one person)	\$ Excluded
	☒	Contractual Liability						PERSONAL & ADV INJURY	\$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:							GENERAL AGGREGATE	\$ 4,000,000
	☐	POLICY ☒ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	\$ 2,000,000
	☐	OTHER:							\$
	AUTOMOBILE LIABILITY							COMBINED SINGLE LIMIT (Ea accident)	\$ 2,000,000
	☒	ANY AUTO						BODILY INJURY (Per person)	\$
	☐	OWNED AUTOS ONLY	☐					BODILY INJURY (Per accident)	\$
	☐	HIRED AUTOS ONLY	☐					PROPERTY DAMAGE (Per accident)	\$
	☐	SCHEDULED AUTOS NON-OWNED AUTOS ONLY	☐						\$
	☐	UMBRELLA LIAB	☐					EACH OCCURRENCE	\$
	☐	EXCESS LIAB	☐					AGGREGATE	\$
	☐	DED	☐						\$
	☐	RETENTION \$	☐						\$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY							☒ PER STATUTE ☐ OTHER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER MEMBER EXCLUDED? (Mandatory in NH)		Y/N ☒ N	N/A	Include WV Broad Form, Employers Liability Section 23-4-2 of WV Code			E.L. EACH ACCIDENT	\$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below							E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
								E.L. DISEASE - POLICY LIMIT	\$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)					

- Project Name
- City of Wheeling and CT Consultants, Inc. are Additional Insured with a Waiver of Subrogation and primary & non-contributor language on all policies except Workers Compensation.
- Workers Compensation includes a Waiver of Subrogation
- It is understood and agreed that any insurance carried by the named Additional insured(s) is excess and in no way contributory or quota share.

CANCELLATION

City of Wheeling 1500 Chapline Street Wheeling, WV 26003	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

© 1988-2015 ACORD CORPORATION. All rights reserved.

SUPPLEMENTAL BOND ACKNOWLEDGEMENT

PROJECT: WPCD G1 BP07 Generator Replacement

OWNER: City of Wheeling, WV

By signature of the attached Contract and these presents the undersigned contractor and his surety acknowledge that the attached Contract Bond or Performance and Payment Bond shall cover and warrant all work for the correction period per the General Conditions and as supplemented or amended elsewhere in these Contract Documents, which period is one (1) year commencing on the final acceptance of the work by Owner. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the project or part of the project is located and shall be instituted within one year from the last day of the correction period under the project or within one year after the Surety refuses or fails to perform its obligations under this Bond, whichever first occurs.

BIDDER

SURETY

BIDDER: _____ SURETY: _____

SIGNATURE: _____ SIGNATURE: _____

NAME: _____ NAME: _____

TITLE: _____ TITLE: _____

DATE: _____ DATE: _____

PHONE NO.: _____ PHONE NO.: _____

*Attach Power of Attorney

APPROVED SUBCONTRACTORS

PROJECT: «TitleCaps»

PRIME CONTRACTOR: «ContractCAPName»

1. Name: _____
Address: _____
City/State/Zip: _____
Description of Work
to be Performed: _____
Phone: _____ Amount: _____ % of Contract: _____
EIN# _____ Unique Entity ID# _____
2. Name: _____
Address: _____
City/State/Zip: _____
Description of Work
to be Performed: _____
Phone: _____ Amount: _____ % of Contract: _____
EIN# _____ Unique Entity ID# _____
3. Name: _____
Address: _____
City/State/Zip: _____
Description of Work
to be Performed: _____
Phone: _____ Amount: _____ % of Contract: _____
EIN# _____ Unique Entity ID# _____
4. Name: _____
Address: _____
City/State/Zip: _____
Description of Work
to be Performed: _____
Phone: _____ Amount: _____ % of Contract: _____
EIN# _____ Unique Entity ID# _____

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

NOTICE TO PROCEED

Project: «Title»

Owner: «OwnerMuni»
«OwnerAddr»
«OwnerCity», «OwnerState» «OwnerZip»

To: «ContractName»
«ContractAddr»
«ContractCity», «ContractState» «ContractZip»

Date: _____

You are hereby notified to commence work in accordance with the Contract. All work shall be completed by «Completion_Date».

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

SECTION 3
GENERAL CONDITIONS

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

Copyright © 2007 National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

The copyright for this EJCDC document is owned jointly by the four EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms.....	1
1.02 Terminology	5
Article 2 – Preliminary Matters	6
2.01 Delivery of Bonds and Evidence of Insurance.....	6
2.02 Copies of Documents.....	6
2.03 Commencement of Contract Times; Notice to Proceed.....	6
2.04 Starting the Work	7
2.05 Before Starting Construction	7
2.06 Preconstruction Conference; Designation of Authorized Representatives	7
2.07 Initial Acceptance of Schedules.....	7
Article 3 – Contract Documents: Intent, Amending, Reuse	8
3.01 Intent.....	8
3.02 Reference Standards.....	8
3.03 Reporting and Resolving Discrepancies.....	8
3.04 Amending and Supplementing Contract Documents.....	9
3.05 Reuse of Documents	10
3.06 Electronic Data.....	10
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points.....	10
4.01 Availability of Lands	10
4.02 Subsurface and Physical Conditions	11
4.03 Differing Subsurface or Physical Conditions.....	11
4.04 Underground Facilities	13
4.05 Reference Points	14
4.06 Hazardous Environmental Condition at Site.....	14
Article 5 – Bonds and Insurance	16
5.01 Performance, Payment, and Other Bonds	16
5.02 Licensed Sureties and Insurers	16
5.03 Certificates of Insurance	16
5.04 Contractor’s Insurance.....	17
5.05 Owner’s Liability Insurance	18
5.06 Property Insurance	18
5.07 Waiver of Rights	20
5.08 Receipt and Application of Insurance Proceeds.....	21

5.09	Acceptance of Bonds and Insurance; Option to Replace	21
5.10	Partial Utilization, Acknowledgment of Property Insurer	21
Article 6 – Contractor’s Responsibilities		22
6.01	Supervision and Superintendence.....	22
6.02	Labor; Working Hours.....	22
6.03	Services, Materials, and Equipment	22
6.04	Progress Schedule	23
6.05	Substitutes and “Or-Equals”	23
6.06	Concerning Subcontractors, Suppliers, and Others.....	25
6.07	Patent Fees and Royalties	27
6.08	Permits.....	27
6.09	Laws and Regulations	27
6.10	Taxes	28
6.11	Use of Site and Other Areas	28
6.12	Record Documents.....	29
6.13	Safety and Protection	29
6.14	Safety Representative.....	30
6.15	Hazard Communication Programs	30
6.16	Emergencies	30
6.17	Shop Drawings and Samples	30
6.18	Continuing the Work.....	32
6.19	Contractor’s General Warranty and Guarantee.....	32
6.20	Indemnification	33
6.21	Delegation of Professional Design Services	34
Article 7 – Other Work at the Site.....		35
7.01	Related Work at Site	35
7.02	Coordination.....	35
7.03	Legal Relationships.....	36
Article 8 – Owner’s Responsibilities.....		36
8.01	Communications to Contractor.....	36
8.02	Replacement of Engineer.....	36
8.03	Furnish Data	36
8.04	Pay When Due	36
8.05	Lands and Easements; Reports and Tests.....	36
8.06	Insurance	36
8.07	Change Orders.....	36
8.08	Inspections, Tests, and Approvals	37
8.09	Limitations on Owner’s Responsibilities	37
8.10	Undisclosed Hazardous Environmental Condition	37
8.11	Evidence of Financial Arrangements	37
8.12	Compliance with Safety Program.....	37
Article 9 – Engineer’s Status During Construction		37
9.01	Owner’s Representative.....	37
9.02	Visits to Site	37

9.03	Project Representative	38
9.04	Authorized Variations in Work	38
9.05	Rejecting Defective Work	38
9.06	Shop Drawings, Change Orders and Payments.....	38
9.07	Determinations for Unit Price Work	39
9.08	Decisions on Requirements of Contract Documents and Acceptability of Work.....	39
9.09	Limitations on Engineer's Authority and Responsibilities	39
9.10	Compliance with Safety Program.....	40
Article 10 –	Changes in the Work; Claims	40
10.01	Authorized Changes in the Work	40
10.02	Unauthorized Changes in the Work	40
10.03	Execution of Change Orders.....	41
10.04	Notification to Surety.....	41
10.05	Claims.....	41
Article 11 –	Cost of the Work; Allowances; Unit Price Work	42
11.01	Cost of the Work	42
11.02	Allowances	45
11.03	Unit Price Work	45
Article 12 –	Change of Contract Price; Change of Contract Times	46
12.01	Change of Contract Price.....	46
12.02	Change of Contract Times	47
12.03	Delays.....	47
Article 13 –	Tests and Inspections; Correction, Removal or Acceptance of Defective Work	48
13.01	Notice of Defects	48
13.02	Access to Work	48
13.03	Tests and Inspections	48
13.04	Uncovering Work.....	49
13.05	Owner May Stop the Work.....	50
13.06	Correction or Removal of Defective Work	50
13.07	Correction Period.....	50
13.08	Acceptance of Defective Work.....	51
13.09	Owner May Correct Defective Work	51
Article 14 –	Payments to Contractor and Completion	52
14.01	Schedule of Values.....	52
14.02	Progress Payments	52
14.03	Contractor's Warranty of Title	55
14.04	Substantial Completion.....	55
14.05	Partial Utilization	56
14.06	Final Inspection.....	56
14.07	Final Payment.....	57
14.08	Final Completion Delayed.....	58
14.09	Waiver of Claims	58

Article 15 – Suspension of Work and Termination	58
15.01 Owner May Suspend Work	58
15.02 Owner May Terminate for Cause	58
15.03 Owner May Terminate For Convenience.....	60
15.04 Contractor May Stop Work or Terminate	60
Article 16 – Dispute Resolution	61
16.01 Methods and Procedures	61
Article 17 – Miscellaneous	61
17.01 Giving Notice	61
17.02 Computation of Times	61
17.03 Cumulative Remedies	62
17.04 Survival of Obligations	62
17.05 Controlling Law	62
17.06 Headings.....	62

ARTICLE 1 – 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.
- 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*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

H:\SPEC\CT STND PARTS - Ohio\General Conditions - EJCDC C-700 Standard General Conditions 2007.pdf

SECTION 4
SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 ed.) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented herein or in the Specific Project Requirements remain in full force and effect.

- SC-1.01 The terms used in these Supplementary Conditions which are defined in the General Conditions have the meaning assigned to them in the General Conditions.
- SC-2.02 Delete paragraph 2.02A in its entirety and insert the following in its place:
- Owner shall furnish one (1) printed/hard copy of the drawings and Project Manual which shall be an executed contract set and one set in electronic format (.pdf), if requested.
- SC 2.03 (A) In the last sentence of 2.03A, change "sixtieth day" to "one hundred twentieth day."
- SC 2.03 (B) By submission of a bid, the bidder hereby grants consent that the award and execution period shall be extended from sixty days to ninety days after the date on which the bids are opened.
- SC-4.02(A) Change "Supplementary Conditions" to read "Specific Project Requirements."
- SC-5.03(A)(1) The required Certificate of Insurance shall be in a form satisfactory to the Owner (most current version of ACORD 25 or approved equal). If the Contractor fails to procure and maintain any specified and/or required insurance, the Owner shall have the right to procure and maintain the said insurance for and in the name of the Contractor and the Contractor shall pay the cost thereof and shall furnish all necessary information to make effective and maintain such insurance.
- SC-5.04(B)(1) Change "Supplementary Conditions" to read "Specific Project Requirements." It is understood and agreed that any insurance carried by the Owner is excess and in no way contributory or quota share.
- SC-5.04(B)(2) The limits of liability for the insurance required by paragraph 5.04(A) of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
- All of the limits below may be satisfied with an Umbrella/Excess Liability as needed to increase the Primary Policy to required limits.
- 5.04(A)(1) and (2) Workers' Compensation, etc., under paragraphs 5.04(A)(1) and 5.04(A)(2) of the General Conditions:

(a) State	Statutory
(b) Applicable Federal (e.g., Longshoreman's):	Statutory
(c) Employer's Liability:	\$1,000,000

5.04(A)(3), (4) and (5). Contractor's Liability Insurance under paragraphs 5.04(A)(3) through 5.04(A)(5) of the General Conditions which shall also include completed operations and product liability coverage.

- (a) Bodily Injury and Property Damage, Combined Single Limit (CSL) (Except Products and Completed Operations) Property Damage liability insurance will provide Explosion, Collapse, and Underground coverage where applicable.

Each Occurrence	\$2,000,000*
-----------------	--------------

General Aggregate	\$4,000,000*
-------------------	--------------

- (b) Products and Completed Operations Aggregate \$2,000,000

Products and Completed Operations to be maintained for two (2) years after final payment and Contractor shall continue to provide evidence of such coverage to the Owner on an annual basis during the aforementioned period.

- (c) Personal and Advertising Injury (Per Person/Organization and per occurrence) with Employment Exclusion deleted. \$1,000,000

- (d) Fire Damage \$100,000

- (e) If the General Liability Policy includes a General Aggregate, such policy shall be endorsed to have the General Aggregate have a Per Project Aggregate Limit.

5.04(A)(6) Automobile Liability - (Owned, Non-Owned, Hired)
Contractor may provide split limits or combined single limit.

- (a) Split Limits:

Bodily Injury,	Each Person:	\$2,000,000
	Each Occurrence	\$2,000,000

Property Damage,	Each Occurrence	\$1,000,000
------------------	-----------------	-------------

or

(b) Combined Single Limit

Bodily Injury and Property Damage, Each Occurrence	\$2,000,000
---	-------------

SC-5.04(B)(3) Add the following to the end of the paragraph: "to the extent available in the insurance industry with industry standard exclusions and as allowed under the laws and regulations in the State of West Virginia;"

SC-5.04(B)(4) Add the following:

Written notice of cancellation for non-payment of premium shall be at least 10 days.

Add the following paragraphs:

SC-5.04(C) Unless otherwise stated in Specific Project Requirements, the Contractor shall purchase and provide an "Owner's and Contractor's Protective Policy" with the Owner listed as the insured for the following limits:

Each Occurrence	\$1,000,000
General Aggregate	\$2,000,000

SC-5.04(D) Unless otherwise stated in Specific Project Requirements the Contractor shall purchase and maintain during the Contract Time "All Risk Builders' Risk Insurance," and/or "Installation Floater Insurance," and/or "Boiler and Machinery Insurance," and any and all insurance requirements of section GC-5.06 of the General Conditions as applicable for the type of work to be performed upon the Project to the full insurable value thereof for the benefit of the Owner, the Contractor, Subcontractors and Suppliers as their interest may appear. This insurance shall cover the work until final acceptance and final payment by the Owner. This provision shall in no way release the Contractor or Contractor's Surety from obligations under the Contract Documents to fully complete the Project. The original policy(s) shall be filed with the Owner or his designated representative.

SC-5.05 *Owner's Liability Insurance*

See SC-5.04(C) above.

SC-5.06 *Property Insurance*

Unless otherwise stated in Specific Project Requirements the Contractor, not the Owner, shall purchase and maintain during the Contract Time all property insurance required in section GC-5.06 of the General Conditions and as outlined in SC-5.04(D) above.

SC-6.02(C) Add the following Paragraph:

The Contractor shall be responsible for the Owner and/or Engineer's additional inspection and administrative costs for work performed beyond regular working hours as defined in this Section.

SC-6.07(B) Delete paragraph 6.07(B) in its entirety.

SC-6.10(B) Add the following:

The Owner is exempt from West Virginia Sales Taxes and, by West Virginia Code §11-15-8d, can now extend this tax exemption to Contractors supplying goods on their behalf. The Contractor shall coordinate with the Owner the filing of any and all applications to the State of West Virginia, exempting the purchase of the specified Goods from West Virginia Sales Tax and hereby agrees to include the savings from such sales tax exemption in its total base bid. from State Sales and Use Taxes on materials and equipment to be incorporated in the Project.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the work
2. Owner's exemption to Contractor does not apply to construction tools, machinery, equipment, or other property by or leased by Contractor, or to supplies or materials not incorporated into the work.

The Contractor shall withhold and/or pay all consumer, use, property, employment, income and other taxes in accordance with the laws and regulations of the United States, State of West Virginia and Owner which are applicable during the performance of the work.

SC 6.17 *Shop Drawings and Samples*

Add the following new paragraphs immediately after paragraph 6.17(E):

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three (3) submittals. Engineer will record Engineer's time for reviewing subsequent materials of shop drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time unless the need for such substitution is beyond the control of the Contractor.

SC-7.02 Delete Section 7.02 of the General Conditions in its entirety and insert the following:

SC-7.02(A) The General Construction Contractor shall be referred to and defined as the Construction Coordinator.

SC-7.02(B) Duties of the Construction Coordinator include the following:

1. Scheduling and coordinating the work of the Prime Contractors including submission and periodic updating of project schedule.
2. Establishing and administrating the site safety program and procedures for the project.
3. See that permits are applied for and obtained on a timely basis. Advise the Engineer of any problems related to permit approval.
4. Monitoring compliance with Laws and Regulations.
5. Maintain project site for dust, sedimentation, debris, waste, and general site cleanliness.
6. Coordinate location and use of temporary construction facilities including but not limited to sanitary, water, power, telephone, and parking.
7. Coordinate Owner interface for utility tie-ins/shut downs.
8. Monitor shop drawing submittal and coordination of submittal information between Prime Contractors.

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

SC-9.03 (B)

B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. Liaison:
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-13.07 (A) In the First sentence of Section 13.07(A) remove "Substantial Completion" and insert "Final Acceptance of the entire project and final payment by the Owner."

SC-13.07(C) Remove 13.07(C) and replace with the following:

All materials and equipment shall be warranted by the respective material supplier or equipment manufacturer until the end of the Contractor's "correction period" (or longer if specified elsewhere in the contract) regardless of date of initial installation or operation of the material or equipment. The cost of such extended warranties as needed from material suppliers or equipment manufacturers to provide warranty coverage until the end of the "correction period" or other period as specified in the contract shall be the responsibility of the prime contractor and shall be assumed to have been included in his bid.

SC-14.02 (A) (3) Delete Section 14.02(A) (3) of the General Conditions in its entirety and insert the following:

Until the job is 50% complete, the Contractor will be paid 92% of the estimated value of labor and material completed in acceptable form. After the work is 50% complete, no further funds shall be retained and the Contractor shall be paid 100% of the estimated value of the remaining labor and material completed in acceptable form, provided that the Contractor is making satisfactory progress and there is no specific cause for greater withholding. Upon the Owner's agreement that the project is substantially complete, the Retainage may be reduced to twice the value of the remaining punch list work subject to the recommendation of the Engineer and the approval by the Owner.

SC-14.02(A) (4) Add the following paragraph:

Payment for stored materials at invoice prices or at the unit price bid for materials, or the lesser value of the two, will be made for accepted nonperishable equipment and materials which are to be incorporated into the work, when accepted, delivered, properly stored, and protected upon the site and verified to the Engineer by a copy of the invoice. For materials and equipment meeting the foregoing conditions, the Owner will pay, when properly included in an approved estimate, 92% of the invoice value of the same. Subsequent to the inclusion of a payment for delivered materials in a progress payment, Contractor shall submit no later than the next payment submission, a partial waiver of lien from each and every supplier for whom delivered materials were paid. If no such waiver is submitted prior to or along with the next payment, the amount of delivered materials paid commensurate with that particular item will be deducted from future payments. No payment for delivered materials shall be made for any items that are scheduled to be incorporated in the work within 30 days of submission of the pay estimate. Delivered materials will not be paid in any given month for a total amount less than \$5,000.00. Payment for delivered materials for such items as pipe backfill and roadway subbase will not be routinely considered.

SC-16.01 Delete Article 16 in its entirety and replace with the following:

ARTICLE 16 - DISPUTE RESOLUTION AGREEMENT - JUDICIAL SYSTEM

OWNER and CONTRACTOR hereby agree that Article 16 of the General Conditions to the Agreement between OWNER and CONTRACTOR is amended to provide for the following agreement of the parties:

16.01 All claims, disputes and other matters in question between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof (except for claims which have been waived by the making or acceptance of final payment as provided by Paragraph 14.09) will be decided through the Ohio County Court of Common Pleas. Arbitration will be entered into only if agreed upon in writing by both parties.

SECTION 5
SPECIFICATIONS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 LOCATION OF THE PROJECT

- A. The project is located in the City of Wheeling, Ohio County, West Virginia. The project site is at the City of Wheeling Water Pollution Control Division (WPCD) located at 2516 Main Street, Wheeling, WV 26003.

1.3 PROJECT SCOPE

- A. The WPCD Gate 1 Electrical Improvements BP07, Generator Replacement Project – Construction Contract includes the complete installation, integration, and commissioning of a fully furnished emergency power system including generators, fuel equipment, and switchgear.
- B. The Work under this Contract includes, but is not limited to
 - 1. Installation of all equipment and accessories
 - 2. Structural modifications and supports (if any) required for installation
 - 3. Installation of mechanical piping systems, valves, and appurtenances
 - 4. Electrical work, including conduit, wiring, terminations, and integration with control panels
 - 5. Instrumentation installation and calibration
 - 6. System integration, testing, and commissioning
 - 7. Coordination with the Equipment Vendor and Manufacturer's field services
 - 8. Startup assistance and operator training support

WPCD G1 BP07 Generator Replacement

- C. The Contractor will furnish, install, integrate, test, commission, and place into satisfactory operation the complete emergency power system shown and specified, including generators, generator accessories, fuel-system equipment, switchgear, automatic transfer equipment, controls, instrumentation, communications, supports, wiring, conduit, piping, and other appurtenances required for a complete and operational installation.
- D. The Construction Contract includes the complete construction, installation, integration, testing, commissioning, and startup of the Generator Replacement Project in accordance with the Contract Documents.

1.4 DEFINITIONS

- A. Contractor: The entity responsible for installation, construction, system integration, and commissioning under this Construction Contract.
- B. Manufacturer: The entity that fabricated individual equipment components. Installation will comply with the manufacturer's requirements.

1.5 PROJECT DESCRIPTION

A. Scope of Work

- 1. The Work includes, but is not limited to the following:
 - a. Field verification and documentation of existing electrical, structural, mechanical, fuel, control, and site conditions.
 - b. Preparation and implementation of a detailed sequence of construction, temporary-power plan, outage plan, and final cutover plan.
 - c. Provision, placement, connection, operation, fueling, maintenance, testing, and removal of temporary generation required to maintain designated emergency plant loads during construction.
 - d. Selective demolition and lawful removal or Owner-directed salvage of existing generators, switchgear, controls, fuel equipment, piping, conduit, wiring, supports, housekeeping pads, and appurtenances shown or specified for removal.
 - e. Installation of new generators and associated starting, charging, cooling, combustion-air, exhaust, silencing, fuel, monitoring, and control systems.
 - f. Installation of switchgear, automatic transfer equipment, distribution equipment, protective devices, grounding and bonding, raceways, conductors, terminations, controls, and communications.

WPCD G1 BP07 Generator Replacement

- g. Structural modifications, equipment pads, housekeeping pads, supports, anchors, penetrations, sleeves, firestopping, patching, painting, and restoration.
- h. Integration with existing plant electrical systems, automatic transfer systems, SCADA, alarms, and other controls shown or specified.
- i. Manufacturer field services, startup, field testing, load-bank testing, functional testing, transfer testing, commissioning, operator training, and correction of deficiencies.
- j. Record drawings, operating and maintenance manuals, test reports, training documentation, spare parts, and closeout deliverables.
- k. For the existing generators, offer first right-of-refusal to the Owner for any equipment slated for salvage. Upon approval, salvage any usable components. If salvage is not possible, remove and dispose.
- l. Receiving and inventorying equipment delivered to the site.
- m. Inspection for damage upon delivery and notification to Owner
- n. Offloading, rigging, and placement of equipment.
- o. Installation of:
 - 1) Generators
 - 2) Exhaust Silencers
 - 3) Fuel tank
 - 4) Day tanks
 - 5) Switchgear
 - 6) Lighting
- p. Installation of all associated fuel piping systems.
- q. Electrical connections to all equipment and systems.
- r. Integration of local and main control panels with plant control systems.
- s. Installation of equipment supports, anchors, and appurtenances.
- t. Coordination of all interfaces between equipment and building systems.
- u. Testing, startup, and commissioning of the complete system.

B. Basis of Design

- 1. The Contractor will install the furnished system in accordance with:
 - a. Approved submittals
 - b. Manufacturer's requirements

c. Contract Documents.

1.6 CONTRACT DOCUMENTS

- A. The Contract Documents include the Project Manual and the Drawings.
- B. The Construction Contract for the installation of the fully integrated packaged emergency electrical system consists of Contract Documents, including, but not limited to: Legal Notice, Table of Contents, Instructions to Bidders, Forms to be completed with the Bid, Contract Forms, General Conditions, Supplementary Conditions, Specific Project Requirements, and the technical specifications, including:
 - 1. Division 01 – General Requirements.
 - 2. Division 03 – Concrete
 - 3. Division 26 – Electrical
 - 4. Division 33 – Control Systems
- C. In general, these Specifications describe the work to be performed by the various trades, other than work specifically excluded. It will be the responsibility of the Contractor and Subcontractors to perform all work incidental to their trade, whether or not specific mention is made of each item, unless such incidentals are included under another Item.
- D. It is advised that the Contractor and all Subcontractors familiarize themselves with the contents of the complete Specifications, particularly for the trades preceding, following, related or adjacent to their work.

1.7 DRAWINGS

- A. The drawings define the Work and include installation details for all equipment systems, piping, mechanical, electrical, and instrumentation integration.
- B. The Contract Drawings contain a detailed description of work to be furnished for the proposed City of Wheeling WPCD, WV – Generator Replacement Project. The scope of work is divided into the Series, presented, and identified under “Sheet Name”. The project includes the following improvements:
 - 1. Series 15M: Mechanical – Sheets 15M-XX, include mechanical schedules, legends and notes; the mechanical demolition plans; and proposed mechanical equipment plans.
 - 2. Series 15E: Electrical – Sheets 15E-XX

3. Series 15I: Instrumentation – Sheets 15I- XX.

C. The Contractor will verify all dimensions and field conditions before installation.

1.8 SCHEDULES AND SEQUENCE OF CONSTRUCTION

A. The Contractor will prepare and submit detailed construction schedules in accordance with the General Conditions. Schedules will identify all phases of the Work from mobilization through Final Acceptance and will include all milestones, critical path activities, coordination requirements with the Owner and Vendor, and all operational impacts.

B. Interruption of existing utility services will be minimized and will be limited to times approved by the Owner.

C. Work will not commence until all labor, materials, and equipment are available, and Owner-furnished components required for the scheduled activities are available.

D. The Contractor will incorporate into the construction schedule all responsibilities defined, including:

1. Demolition and preparatory work
2. Equipment ordering and lead times
3. Installation of temporary rental generator and temporary distribution equipment
4. Removal of existing louvers, generators, and switchgear
5. Installation of new equipment
6. Electrical conduit, conductors, cable, and terminations
7. Mechanical exhaust ducting, fuel piping, valves, and associated rated fittings
8. Low voltage control cabling and programming
9. Startup, testing, commissioning, and Coordination with Vendor-provided field services

E. The schedule will clearly identify all tasks assigned to the Contractor under the Construction Contract and all tasks performed by the Vendor under the Equipment Procurement Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with Section 016600, Product Storage and Handling Requirements.
- B. The Contractor will:
 - 1. Verify equipment condition upon delivery
 - 2. Provide proper storage and protection
 - 3. Install equipment in accordance with the Manufacturer's requirements.
- C. The Contractor-Furnished Materials: The Contractor will furnish all materials not specifically identified as Owner-furnished, including:
 - 1. Piping and fittings
 - 2. Supports and anchors
 - 3. Conduit, wiring, and terminations
 - 4. Grouting and installation materials
 - 5. Miscellaneous hardware and accessories.

2.2 STORAGE AND HANDLING

- A. The Contractor will be responsible for:
 - 1. Receiving equipment transferred from the manufacturer's storage
 - 2. Protecting equipment from damage or environmental exposure
 - 3. Maintaining storage conditions in accordance with Manufacturer requirements
- B. Responsibility for equipment transfers to the Contractor upon delivery to the site.

2.3 CONTRACTOR USE OF SITE

- A. Electrical outages and transfer interruptions will not occur without the Owner's written authorization. The Contractor will submit a detailed Outage and Cutover Plan for each interruption. The plan will identify affected equipment and processes, anticipated interruption duration, temporary-power provisions, personnel and equipment required, switching sequence, lockout/tagout boundaries, contingency actions, abort criteria, restoration sequence, and verification testing. Unless otherwise approved in writing, outage requests will be submitted not less than 14 calendar days before the proposed outage. Approval of an outage request does not relieve the Contractor of responsibility for maintaining the designated plant systems and loads.
- B. The maximum permitted interruption for each load or system will be as indicated in the approved outage schedule. A generalized four-hour allowance will be permitted for interruptions, however, that allowance will not be interpreted as permission to interrupt any critical plan load for four hours without approval and planning. Request for a partial shutdown will be submitted to the City no less than 48 hours prior to the requested shutdown period.
- C. The City of Wheeling WPCD facility operations staff normally works from 7:00 AM to 3:00 P.M. Monday through Friday, at which time the main entrance gate is secured. The Contractor will coordinate in advance with the Owner to obtain site access for deliveries, start-up activities, or other work occurring outside normal operating hours.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. Install equipment in strict accordance with the manufacturer's instructions.
- B. Field verify dimensions and condition prior to installation.
- C. Coordinate all trades and interfaces
- D. Provide alignment, leveling, anchoring, and grouting.

3.2 PROTECTION OF WORK AND IMPROVEMENTS

- A. Contractor will protect the property of the Owner, existing improvements, and the Work installed by the Contractor and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.

WPCD G1 BP07 Generator Replacement

- B. Contractor will provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.
- C. Contractor will keep property, existing improvements, and the Work, including structures, piping, fittings, and accessories, free from dirt and foreign matter at all times.
- D. Contractor will provide temporary plugging of openings, holes, and pipe ends that are existing or that the Contractor has installed.
- E. Property, improvements, and Work damaged by Contractor will be repaired or replaced by Contractor to the satisfaction of the Owner.

3.3 TESTING AND COMMISSIONING

- A. The Contractor will:
 - 1. Perform pre-operational inspections
 - 2. Assist the manufacturer or manufacturer's authorized service representative with startup.
 - 3. Perform function and performance testing
 - 4. Correct deficiencies identified during testing.
 - 5. Conduct operator instruction and training.

3.4 ALLOWANCE

- A. Temporary power and rental-generator requirements are specified in Section 012100, Allowances, and the applicable temporary-power and electrical sections.

END OF SECTION 011100

SECTION 011419 – USE OF SITE

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor's use of the site shall be limited to the areas indicated on the Drawings or approved in writing by the Owner. The Contractor shall not use other plant areas for parking, storage, fabrication, laydown, crane setup, or access without prior written authorization.
- B. The WPCD facility shall remain operational throughout construction. Contractor activities shall not interfere with treatment operations, laboratory activities, chemical delivery, sludge hauling, emergency access, operator access, or access to electrical and process equipment.
- C. Submit crane setup, lifting, and equipment-movement plans before mobilizing cranes or rigging equipment. Plans shall identify outrigger loads, underground utilities, overhead clearances, equipment weights, travel paths, barricades, and interference with plant operations.

1.2 USE OF STREETS

- A. During the progress of the work, the Contractor shall make ample provisions for both vehicle and pedestrian traffic on any public street and shall indemnify and save harmless the Owner from any expense whatsoever due to their operations over said streets or walks. The Contractor shall also provide free access to all the fire hydrants, water, and gas valves located along the line of his work. Gutters and waterways must be kept open, or other provisions must be made for the removal of stormwater.
- B. In the event of the Contractor's failure to comply with these provisions, the Owner may cause the same to be done and may deduct the cost of such work from any monies due the Contractor under this Agreement, but the performance of such work by the Owner at its instance shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the work.
- C. The Contractor shall repair at no cost to the Owner all existing roads, parking areas, and grassed areas that are damaged due to the execution of his work. The Contractor shall remove daily all debris that may be tracked onto existing streets, drives, or walks by his equipment or that of subcontractors or suppliers.

1.3 PROTECTING EXISTING BUILDINGS, STRUCTURES, AND ROADWAYS

- A. The Contractor shall, at his own expense, shore up and protect any buildings, roadways, utilities, or other public or private structures which may be encountered or endangered in the prosecution of the work, and that may not be otherwise provided for, and he shall repair and make good any damages caused to any such property by reason of his operations. All existing fences removed due to the prosecution of the work shall be replaced by the Contractor. No extra payment will be made for said work or material, but the cost of this work must be included in the price stipulated for the work to be done under this contract.

1.4 SITE FACILITIES

- A. Provide sanitary facilities for Contractor and Subcontractor personnel. Do not use existing Owner facilities unless specifically authorized in writing.

1.5 RESTORATION

- A. The Contractor shall restore all areas per the plans and specifications, and if not specified, at least to the conditions existing prior to the start of work.

END OF SECTION 011419

SECTION 011423 - ADDITIONAL WORK, OVERTIME

PART 1 - GENERAL

1.1 NIGHT, SUNDAY AND HOLIDAY WORK

- A. Work Outside Normal Hours: Work during nights, weekend, or legal holidays shall be performed only when required by the Contract Documents, approved outage and cutover plans, an emergency, or prior written authorization from the Owner.
- B. Contractor Requested Work: When off-hours work is requested for the Contractor's convenience, submit the request not less than two working days in advance. Approval of the request does not authorize additional compensation or extension of Contract Time.
- C. Scheduled Electrical Outages: Advance notice for electrical shutdowns, temporary-power transfers, and final cutovers shall comply with Section 011100 and the approved outage plan. The two-working-day notice provision does not supersede longer outage notification requirements.
- D. Observation and Inspection: Do not conceal work performed without required observation or inspection. The Contractor shall uncover, expose, or retest such work when directed and shall bear the associated cost when the lack of inspection resulted from failure to provide the required notice.
- E. Normal Working Hours: Defined as 7:00 AM to 3:00 PM.
- F. Emergency: An emergency is an unplanned condition requiring immediate action to protect life, property, the environment, or continuity of essential plant operations. Contractor scheduling difficulties do not constitute an emergency.

END OF SECTION 011423

SECTION 012100 - ALLOWANCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. This Section governs the stipulated lump-sum allowance for temporary rental-generator service.

Temporary Rental Generator Allowance: Include a stipulated allowance of \$31,000 in the Contract Sum for temporary rental-generator service required during replacement and commissioning of the permanent emergency-power system.

- 1. This allowance shall be used only upon written direction by the Owner through the procedures established in the Contract Documents.
- 2. The allowance includes only the rental supplier's invoiced charges specifically approved by the Owner. Unless expressly included in the written allowance authorization, the Contractor's labor, supervision, temporary conductors, terminations, grounding, protection, fuel-system connections, setup, testing, maintenance, fuel, removal, and restoration shall be included in the Contractor's base bid.
- 3. Provide a rental generator having not less than the capacity indicated in the approved sequence-of-construction plan. The presently anticipated nominal capacity is 750kW; the Contractor shall verify suitability for the connected loads, motor starting, voltage drop, frequency, protective-device coordination, and ATS operation before mobilization. A temporary switchboard will be required to be fed from the temporary generator in order to feed the (4) existing ATS's while the existing gear and generators are removed so that new equipment can be installed. Peak loading observed over 30 days for the transfer switches are as follows: ATS-1 @ 613A,

WPCD G1 BP07 Generator Replacement

ATS-2 @ 219A, ATS-3 @ 221A, and ATS-4 @ 290A.

4. The rental period shall begin only upon written Notice to Proceed with temporary-power deployment issued by the Owner. Rental charges incurred before that authorization are not chargeable to the allowance.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Modification Procedures" specifies procedures for submitting and handling Change Orders.
2. Division 1 Section "Quality Control Services" specifies procedures governing the use of allowances for inspection and testing.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise the Engineer of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At the Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by the Engineer from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. The stipulated allowance is included in the Contract Sum. Contractor overhead and profit applicable to allowance adjustments shall be treated in accordance with the General and Supplementary Conditions. No separate markup shall be applied to the original allowance amount unless expressly stated in the Bid Form.

WPCD G1 BP07 Generator Replacement

- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to the Owner by Change Order.

1.6 INSPECTION AND TESTING ALLOWANCES

- A. Inspection and testing allowances include the cost of engaging the inspection or testing agencies, the actual inspections and tests, and reporting the results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting upon failure of previous tests and inspections.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the inspection and testing allowance to Owner by Change Order.

1.7 UNUSED MATERIALS

- A. Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
 - 1. When requested by the Engineer, prepare unused material for storage by Owner where it is not economically practical to return the material for credit. When directed by the Engineer, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly upon delivery for damage or defects.

WPCD G1 BP07 Generator Replacement

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 012100

SECTION 013119 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION MEETING

- A. Prior to the Contractor beginning any work on the project, the Owner will schedule and hold a preconstruction meeting to discuss all aspects of the contract work.
- B. The Contractor shall be present and be prepared to comment in detail on all aspects of his work.
- C. The Contractor shall bring to the preconstruction meeting:
 - 1. Construction schedule
 - 2. Submittal register
 - 3. Procurement and delivery schedule
 - 4. Site logistics and laydown plan
 - 5. Temporary power plan
 - 6. Outage and cutover plan
 - 7. Existing generator removal and new generator installation sequence
 - 8. Crane and rigging plan
 - 9. Safety plan
 - 10. Lockout/tagout coordination procedure
 - 11. Quality-control plan
 - 12. Commissioning plan
 - 13. Testing schedule
 - 14. Manufacturer field-service schedule
 - 15. Operator training plan
 - 16. List of proposed subcontractors and key project personnel

WPCD G1 BP07 Generator Replacement

- D. Do not begin the affected portion of the Work until required submittals and plans have received the review or acceptance required by the applicable Contract Documents.

1.2 PROGRESS MEETINGS

- A. During temporary-power installation, electrical outages, equipment replacement, startup, and commissioning, the Owner may conduct activity-specific coordination meetings. Attendance and preparation of such meetings shall be included in the Contract Sum.
- B. Weekly progress meetings will be held at a location to be determined by the Owner on a regularly scheduled day mutually convenient to the Owner, Contractor, and Engineer.
- C. The Contractor shall provide an updated construction progress schedule and be prepared to comment in detail on all aspects of his work.
- D. Conduct a pre-outage coordination meeting before each major electrical outage, temporary-power transfer, or final cutover. Review the approved switching sequence, responsibilities, communication protocol, lockout/tagout boundaries, contingency plan, abort criteria, restoration sequence, and required personnel.
- E. Conduct commissioning-planning meetings sufficiently in advance of generator startup and integrated system testing. Include the Contractor, electrical subcontractor, generator manufacturer, switchgear or ATS manufacturer, controls integrator, testing agency, Owner, Engineer, and other parties as required for the planned activities.

END OF SECTION 013119

SECTION 013233 – PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.

1.3 PROGRESS PHOTOGRAPHS

- A. The Contractor shall take and submit progress photographs weekly throughout construction. Each weekly submission shall include a sufficient number of photographs to document active work areas, concealed work, existing conditions affected by construction, equipment installation, temporary facilities, and work completed during the reporting period.
- B. Format: Provide photographs as cut-and-paste files onto a Word document (maximum 4 images to a page). Save digital page files in PDF format.
- C. Identification: On each page of photos, provide the following information:
 - 1. Owner's Name
 - 2. Contract Description
 - 3. Contractor's Name
 - 4. Description of view, indicating location, direction (by compass point), and elevation or story of construction

WPCD G1 BP07 Generator Replacement

5. Date photograph was taken
- D. Provide specific photographs (as applicable) for the following milestone conditions:
1. Preconstruction photographs before mobilization or disturbance
 2. Existing equipment and interfaces before demolition
 3. Concealed conditions before enclosure
 4. Underground utilities before backfill
 5. Generator, transfer equipment, conduits, grounding, controls, and fuel-system interfaces
 6. Equipment nameplates
 7. Startup and testing
 8. Final completion conditions

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in PDF format as noted above or as otherwise submitted to the Engineer as individual photographs, with a minimum sensor size of 4 megapixels.

PART 3 - EXECUTION

3.1 GENERAL

- A. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken, so the stamp is integral to the photograph.
- B. Field Office Prints: Retain one set of prints of progress photographs in the field office at the project site, available at all times for reference. Identify photographs the same as those provided to the Engineer.

END OF SECTION 013233

SECTION 013236 – VIDEO MONITORING AND DOCUMENTATION

PART 1 - GENERAL

1.1 SCOPE

- A. Provide all labor, materials, equipment, and services, and perform all operations necessary to furnish to the Owner a complete color audio-video record on a USB Flash Drive of the surface features within the proposed construction zone of influence. This record shall include, but not be limited to, all audio-video USB Flash Drives, storage cases, video logs, and indexes. The purpose of this coverage shall be to accurately document the pre-construction condition of these surface features.
- B. The 'zone of influence' may be defined as the limits of disturbance for the project to include:
 - 1. Access and haul routes
 - 2. Staging and laydown areas
 - 3. Existing buildings and rooms affected by the work
 - 4. Pavement, curbs, sidewalks, fencing, landscaping, and drainage features
 - 5. Existing electrical, generator, fuel, ventilation, and control equipment
 - 6. Adjacent property potentially affected by vibration, excavation, lifting, or traffic
- C. Complete the recording after the preconstruction conference and before mobilization, demolition, excavation, equipment removal, or other disturbance. Do not begin disturbance within a recorded area until the Engineer has received the complete recording and index.

1.2 QUALIFICATIONS

- A. The documentation shall be provided in MP4 or another nonproprietary format. It must be a continuous, stabilized color recording with audible narration and should include date, time, location, direction of travel, and feature identification. Provide the video log cross-referenced to file names and timestamps. Provide one electronic download submission plus USB only if the Owner requires physical media. Verify that all submitted files open and play correctly.
- B. The Engineer may reject incomplete, poorly illuminated, unstable, inaudible, corrupt, or insufficiently indexed recordings and require rerecording before construction disturbance.

WPCD G1 BP07 Generator Replacement

1.3 PRODUCTS

- A. The color audio-video recording delivered to the Owner shall be on a high-quality USB Flash Drive.

END OF SECTION 013236

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section defines the requirements for preparation, submission, review, and resubmission of shop drawings, product data, and related submittals required to demonstrate compliance with the Contract Documents.
- B. All submittals shall be prepared by the Manufacturer and reviewed and approved by the Contractor prior to submission to the Engineer. The Contractor approval constitutes confirmation of coordination, completeness, and conformance with the Contract Documents.
- C. Requirements of Section 013323 govern the preparation, review, and approval of all submittals associated with the equipment installation of the emergency generator packaged system as described in Section 011100.

1.2 GENERAL REQUIREMENTS

- A. The Contractor shall be responsible for coordination, review, and submission of all submittals required for the Work under the Construction Contract. The Contractor shall field verify all dimensions submitted, and coordinate with all trades for compliance with the installation requirements under the Construction Contract.
- B. The Contractor's responsibilities under this Section are in addition to those defined in Section 011100 and include all activities necessary to properly procure, install, integrate, test, and commission the emergency generator packaged equipment.
- C. The Contractor shall be responsible for the coordination of all submittals and shall ensure that submittals are compatible with field conditions, installation requirements, and related Work.
- D. Submittals shall also demonstrate that the proposed equipment and materials can be properly installed within the existing facility conditions and coordinated with structural, mechanical, electrical, and instrumentation systems.
- E. Prior to submission and installation, the Contractor shall:
 - 1. Procure all equipment.

WPCD G1 BP07 Generator Replacement

2. Receive equipment.
3. Provide for temporary emergency power support.
4. Verify field conditions: Confirm all dimensions, elevations, clearances and utilities locations affecting the Work.
5. Coordinate with all trades: Ensure compatibility with structural, mechanical, electrical, and instrumentation systems.
6. Confirm installation requirements: Review manufacturer instructions, access needs and lifting/rigging constraints.
7. Resolve conflicts: Identify and correct discrepancies between field conditions, Contract Documents, and manufacturer data before submitting.
8. Integrate equipment: Verify interfaces, connections, and support requirement for all Owner-provided components.
9. Ensure completeness: Confirm that each submittal package includes all required drawings, certifications, and coordination information.

1.3 ENGINEER REVIEW

- A. Review of submittals by the Engineer is for general conformance with the design concept and Contract Documents only. Such review does not relieve the Contractor of responsibility for accuracy, completeness, coordination, proper fit, functioning, performance, or compliance with all Contract requirements.
- B. Engineer review shall not relieve the Contractor of responsibility for field verification, coordination, installation, system integration, or compliance with the Construction Contract requirements.
- C. The engineer review does not extend to means, methods, techniques, sequencing, procedures of construction, or safety precautions.
- D. Review by the Engineer shall not relieve the Contractor of responsibility for:
 1. Accuracy and completeness of submittals
 2. Proper fit, functioning, and performance
 3. Coordination of the Work
 4. Compliance with all Contract requirements.

- E. Engineer review shall not be construed as approval of deviations from the Contract Documents unless such deviations are specifically identified in writing and expressly accepted.

1.4 SUBMITTAL SCHEDULING

- A. Shop Drawings shall be submitted in proper sequence and sufficiently in advance regarding the time required for checking, transmittal, and resubmittal without delay in the Work.
- B. The Contractor shall incorporate all required submittals into the Project schedule and shall coordinate submittal sequencing with procurement, delivery, installation, and commissioning activities.
- C. Failure to submit required submittals in a timely manner shall not constitute grounds for time extension.
- D. Allow a minimum of twenty-one (21) calendar days for Engineer review following receipt of a complete submittal.
- E. No Work requiring shop drawing shall proceed until submittals have been reviewed by the Engineer.
- F. Accepted and reviewed Shop Drawings shall not be construed as approval of changes from Contract plan and specification requirements.
- G. The Owner may deduct from amounts due the Contractor the Engineer's documented costs associated with review of a third or subsequent submission necessitated by incomplete, incorrect, or nonconforming prior submissions.
- H. A detailed field performance testing plan shall be submitted for review prior to shipment, including duration, sampling methods, acceptance criteria, and corrective action procedures.

1.5 SUBMITTAL PROCEDURE FOR THE EQUIPMENT PROCUREMENT CONTRACT

- A. All submittals shall be transmitted to the Engineer by the Contractor. Submittals prepared by Manufacturers or Vendors shall be routed through the Contractor for review, coordination, and approval prior to submission.

WPCD G1 BP07 Generator Replacement

- B. The Contractor shall review all submittals associated with the equipment and shall verify compatibility with installation requirements, utilities, supports, and field conditions prior to submission.
- C. Submittal Preparation: Mark each submittal with a permanent label or page for identification. Provide the following information on the label for proper processing and recording of action taken:
1. Project name
 2. Contract name
 3. Location
 4. Engineer's name and address
 5. Vendor of the complete packaged system
 6. Manufacturer name and address of individual equipment.
 7. Specification Section number and title
 8. Drawing numbers and detail references
 9. Submittal sequence or log number
 10. Space for Vendor approval and Engineer action stamp.
- D. Each submittal shall include the following certification statement signed by the Contractor:
- By this submittal, I hereby certify that all constraints, construction criteria, materials, dimensions, catalog numbers, and related data have been determined and verified, and that each item has been checked and coordinated with all applicable approved shop drawings and Contract requirements.
- E. Each submittal shall include the following certification statement signed by the Contractor:

By this submittal, the Contractor certifies that the submittal has been reviewed, coordinated, and verified for compliance with field conditions, Contract Documents, and related Work. The Contractor further certifies that dimensions, quantities, and installation requirements have been checked and that the Work will be constructed in accordance with the reviewed submittal.

WPCD G1 BP07 Generator Replacement

Signature

Date

Company

- F. Shop Drawings shall be submitted in electronic format for review. Upon approval by the Engineer, the Contractor shall provide the final approved Shop Drawings in electronic format only; no hard copies are required.
- G. The Contractor shall provide an updated submittal schedule due after Notice to Proceed.
- H. The Contractor shall provide any identifications of substitutions, identification of deviations on a dedicated cover sheet, a resubmittal tracking of prior comments, as well as a final closeout submittal O&M manual, testing records, and any warranties upon completion of the installation.

1.6 DEVIATIONS

- A. The General Contractor shall clearly identify all deviations from the Contract Documents at the time of submittal.
- B. Failure to identify deviations shall constitute a representation that the submittal fully complies with the Contract Documents and shall not be grounds for subsequent claims.

1.7 ENGINEER ACTION

- A. The Engineer will review each properly submitted submittal and stamp it to indicate action taken.
- B. Review of individual components does not constitute review of assemblies; complete systems shall be submitted as coordinated packages.

- C. Compliance with Contract requirements remains the Contractor's responsibility regardless of review status.

1.8 REVIEW PROCEDURE

- A. Drawings shall be clean, legible, and shall show necessary working dimensions, arrangement, material finish, erection data, and information needed to define what is to be furnished and to establish its suitability for the intended use. Specifications may be required for equipment or materials to establish any characteristics of performance where such are pertinent. Suitable catalog data sheets showing all options and marked with complete model numbers may, in certain instances, be sufficient to define the articles which it is proposed to furnish.
- B. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - 1. Reviewed – No Exceptions Taken: Submittal is in general compliance; no resubmittal required.
 - 2. Reviewed – Approved as Note: Minor comments noted; resubmittal not required.
 - 3. Revise and Resubmit: Submittal is incomplete or inadequate; resubmittal required.
 - 4. Rejected: Submittal does not comply with Contract Documents; new submission required.
- C. Submittals requiring a Change Order will not be returned until the Change Order is approved or otherwise directed by the Owner. Deviations with cost or schedule effects must be separately identified, and fabrication of affected work is prohibited until the contractual change is resolved.

END OF SECTION 013323

SECTION 013325 - WARRANTY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section provides procedures and requirements for warranting the Work. The enumerated warranties herein are in no way intended to abrogate any implied warranties associated with goods supplied under this Contract.
- B. Unless otherwise designated, the final warranty will take effect on the date of Substantial Completion for the installation of the generator system, with special equipment warranties governed by their individual sections. If early equipment operation or beneficial use occurs, the Contract Documents should explicitly address that condition.

1.2 SUMMARY

- A. Work Included:
 - 1. Preparation of Warranties for submittals.
 - 2. Requirements for the content and submittal of Warranties.

1.3 RELATED DOCUMENTS

- A. This Section includes minimum requirements for the warranty of the equipment. See also all equipment specification sections for additional requirements.
- B. Section 013323, Shop Drawings, Product Data, and Samples.

1.4 SUBMITTALS

- A. As a part of the submittals for each item of equipment or a group of equipment items, include a DRAFT Warranty containing all of the language and terms specified.
- B. Following completion of the terms for establishment of the Warranty specified, prepare Warranties for submittal per section 013323 and the following:

WPCD G1 BP07 Generator Replacement

1. Warranties for projects or portions of the work, established on a particular date as specified herein, may be submitted as a group.
2. Label each submittal with the title "WARRANTY", the project name, the effective date, the Contractor's name, address, and telephone number.
3. A Table of Contents shall be included, identifying each item with a number and title of specification section and the name of the product or Work item.
4. Separate Warranty for each specification section item with index tab sheets. Label tables to conform to the Table of Contents.

C. The Warranty shall contain, as applicable:

1. Effective starting date and end date of the Warranty period.
2. Statement of the terms and conditions of the Warranty, if any.
3. Statement that all Operating and Maintenance information has been provided and approved.
4. Statement that all training and training materials have been provided and approved.
5. Statement that the equipment or system commissioning is substantially complete and has been reviewed and accepted by the manufacturer in accordance with provisions of the individual Sections in Divisions 1 through 46 of the Project Manual, as applicable.
6. Certifications by the Contractor and/or Manufacturer that the statements noted above are true and correct. This certification shall be signed by a person authorized to sign documents on behalf of the Contractor.

D. Special warranties, as required by individual Sections in Divisions 1 through 46 of the Project Manual, shall be submitted in accordance with the requirements of this Section.

PART 2 - PRODUCTS

2.1 WARRANTIES

A. Term or Period

1. The Warranty shall guarantee that the equipment is free from defects in materials and workmanship for a period of twelve (12) months from the date of Substantial

WPCD G1 BP07 Generator Replacement

Completion and successful startup, unless a longer warranty period is specified in the applicable individual Sections of Divisions 1 through 46 of the Project Manual.

B. Contractor's Responsibilities

1. The Contractor shall correct warranted defects and coordinate all required manufacturer or supplier repair and replacement work. Manufacturer warranties supplement and do not limit the Contractor's obligations under the Contract Documents.

PART 3 - EXECUTION

3.1 EXECUTION OF WARRANTY

- A. The approved DRAFT Warranty will be executed and placed in effect as the FINAL Warranty on the date of Final Completion of the Work for the specific equipment item or group named in the Warranty.

END OF SECTION 013325

SECTION 013326 – PRODUCT TESTING AND CERTIFYING

PART 1 - GENERAL

1.1 QUALITY OF MATERIALS

- A. Where the specifications require mill or factory tests, the Manufacturer shall furnish duplicate copies of certified manufacturer's test reports demonstrating compliance with the Contract requirements, including applicable quality and performance data.
- B. Factory testing requirements shall be applicable only where specifically required by the technical specifications. Factory witness testing shall not be required unless explicitly identified within the individual specification section.
- C. Unless otherwise specified, all materials, equipment, and articles shall be erected, installed, or connected, and used, cleaned, and conditioned in accordance with the printed instructions and directions of the manufacturer.
- D. The installation shall be so made that its several components will function together as a workable system. It shall be complete with all accessories necessary for its operation and shall be left with all equipment properly adjusted and in working order.
- E. The work shall be executed in conformity with the best practice and to contribute to efficiency of operation, minimum maintenance, accessibility, and sightliness. It shall also be executed so that the installation will conform and accommodate itself to the building structure, its equipment, and usage.
- F. Refer to Instructions to Bidders and individual specification sections for substitution procedures. References to specific manufacturers are intended to establish minimum quality, performance, dimensional, integration, and service requirements.

1.2 QUALITY ASSURANCE

- A. Manufacturer-certified startup reports shall be submitted demonstrating successful installation, commissioning, operational testing, alarm verification, and compliance with specified performance requirements.

1.3 EXPERIENCE CLAUSE REQUIREMENT AND PERFORMANCE BONDS FOR MANUFACTURER

- A. Manufacturers considered for this equipment shall have a minimum of five years documented experience producing equipment of similar type and size and shall maintain a demonstrated service organization capable of supporting the equipment within the region.
- B. Agents of bonding companies which write bonds for the performance and payment of the contract shall furnish the power of attorney bearing the seal of the company, evidencing such agent's authority to execute the particular type of bond to be furnished, and evidencing also the right of the surety company to do business in the State of West Virginia. A copy of this proof shall be attached to each copy of the contract.
- C. The bond shall be purchased through a surety company with a local agent upon whom service of process can be made.
- D. In the event of failure of surety or co-surety, the manufacturer shall immediately furnish a new bond, as required herein. The manufacturer's bond will not be released until all provisions of the contract have been fulfilled.

END OF SECTION 013326

SECTION 013326.01 - QUALITY CONTROL PLAN

PART 1 - GENERAL

1.1 QUALITY CONTROL

- A. The Contractor shall be responsible for the quality of all materials incorporated into the project work and shall be responsible for all costs of testing and certification of the same. The Contractor shall provide the City Engineer with a list of three (3) local qualified firms for the City to select from to be the Contractor's testing firm.
- B. The Contractor shall provide the Engineer with a Quality Control Plan in which their testing methods/procedures are defined. Said Plan shall meet with the approval of the Engineer and include identification of laboratories, types of testing, and the tentative amount and scheduling of each.
- C. All certifications of tests and/or gradations for materials to be utilized in the work and all quality control testing shall be performed by an independent laboratory (not affiliated with, owned by, or managed by the Contractor).
- D. The Owner may perform field Quality Assurance testing; however, such testing shall not relieve the Contractor from the responsibility of Quality Control testing or from supplying certificates from manufacturers or suppliers to demonstrate compliance with the specifications. It is intended that the testing by the Contractor and the Owner be complimentary toward a quality project; however, the Contractor may not assume the Owner will test or that any tests will be done in lieu of the Contractor's own Quality Control testing. In the same sense, the Contractor may not rely on Owner Quality Assurance testing as a basis of acceptance or approval of his work, nor may any Owner-performed testing be reflected in his submitted plan.
- E. Contractor Quality Control plans must address:
 - 1. Site Verification
 - a. Existing generator conditions
 - b. Existing electrical infrastructure
 - c. Existing fuel systems
 - d. Existing duct banks and conduits
 - 2. Equipment Receipt Inspection
 - a. Shipping damage
 - b. Storage requirements

WPCD G1 BP07 Generator Replacement

- c. Manufacturer preservation or special instructions
- 3. Installation QA/QC
 - a. Anchor bolt verification
 - b. Concrete pad verification
 - c. Equipment alignment
 - d. Electrical torque checks
 - e. Grounding verification
- 4. Electrical Testing
 - a. Insulation resistance testing
 - b. Ground testing
 - c. Phase rotation verification
 - d. Protective device settings verification
- 5. Controls Verification
 - a. Alarm verification
 - b. ATS functionality
 - c. Remote monitoring functionality
- 6. Startup Testing
 - a. No-load testing
 - b. Load testing
 - c. Automatic transfer testing
 - d. Emergency failure recovery testing
- 7. Documentation
 - a. Startup reports
 - b. Test reports
 - c. Deficiency logs
 - d. Corrective actions

1.2 TEST CRITERIA

- A. The following tests at a minimum shall be included with the Contractor's Quality Control Plan in accordance with the specifications:

1. Concrete Mix Design

- a. For each type of concrete, the laboratory shall perform the necessary mix design, providing all test data as required by the specifications.

2. Concrete Field and Laboratory Tests

- a. The laboratory shall cast concrete cylinders and test beams:

- 1) One set of four cylinders per 50 C.Y. with a minimum of two sets per day. The cylinders shall be broken: one at 7 days, two at 28 days, one at 56 days, unless otherwise directed by the Engineer.

- 2) One beam per 50 C.Y. with a minimum of two beams per day.

- b. Temperature and unit weight shall be run on fresh concrete at intervals sufficient for the type of structure being placed and a minimum of once per day. Bulk weight, bucket weight, (tare), net weight, bucket factor (bucket volume), and unit weight shall be recorded on the fresh concrete report. Show all batch weights for yield calculations. Slump and air content tests shall be taken with a minimum of one test per 20 C.Y. and at least once per day.

- c. All field and laboratory testing shall be performed by technicians certified by the American Concrete Institute (ACI) for the type of testing performed.

- d. Initial cure of all cylinders shall be in a temperature-controlled cure box or temperature-controlled water tank with a hi-low thermometer. Hi-low temperature readings shall be recorded on the fresh concrete report.

1.3 LABORATORY REPORTS

- A. Reports of laboratory and field tests will be distributed to the Engineer, Owner, and Suppliers within 24 hours of completion.

END OF SECTION 013326.01

SECTION 014223 - INDUSTRY STANDARDS

PART 1 - GENERAL

1.1 ABBREVIATIONS

A. Abbreviations, as used, designate the following:

ACI	-	American Concrete Institute
AIEE	-	American Institute of Electrical Engineers
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASCE 7	-	American Society of Civil Engineers Standard 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures
ASTM	-	American Society of Testing and Materials
AWWA	-	American Water Works Association
CMS	-	Construction and Material Specifications
EPA engine emissions requirements	-	40 CFR Parts 60, 89, 1039, or applicable Tier Requirements
IBC	-	International Building Code
IEEE Standards	-	Institute of Electrical and Electronics Engineers Standards
ISO 8528	-	Reciprocating Internal combustion Engine Driven Alternating Current Generating Sets
NEMA	-	National Electrical Manufacturers Association
NETA ATS	-	InterNational Electrical Testing Association Acceptance Testing Specifications for Electrical Power Equipment and Systems
NFPA 30	-	National Fire Protection Association: Flammable and Combustible Liquids Code

WPCD G1 BP07 Generator Replacement

NFPA 37	-	National Fire Protection Association: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 54	-	National Fire Protection Association: National Fuel Gas Code
NFPA 70 (NEC)	-	National Fire Protection Association: (National Electrical Code)
NFPA 70B	-	National Fire Protection Association: Standard for Electrical Equipment Maintenance
NFPA 101	-	National Fire Protection Association: Life Safety Code
NFPA 110	-	National Fire Protection Association: Standard for Emergency and Standby Power Systems
W. Va Code	-	West Virginia Code Chapters
UL2200	-	Underwriters Laboratories, Inc.: Standard for Stationary Engine Generator Assemblies

1.2 REFERENCE TO OTHER SPECIFICATIONS

- A. Where reference is made to specifications such as ASTM, AWWA, or ANSI, the latest edition shall be used, unless otherwise noted on the plans or in the specifications.
- B. Where conflicts exist between referenced standards and Contract Documents, the more stringent requirement shall govern unless otherwise directed by the Engineer.

1.3 CODES AND STANDARDS

- A. All work provided for by these specifications must be installed according to the provisions of the State and local building codes, subject to inspection and acceptance by the State and local inspectors.

END OF SECTION 014223

SECTION 014323 – QUALIFICATIONS OF TRADESMEN

PART 1 - GENERAL

1.1 CHARACTER OF WORKMEN AND EQUIPMENT

- A. The Contractor shall employ competent and efficient workmen for every kind of work. Any person employed on the work who shall refuse or neglect to obey directions of the Owner or his representative, or personnel whose conduct, qualifications, safety practices, or work performance materially interfere with contract performance, or who shall commit trespass upon public or private property in the vicinity of the work, shall be dismissed when the Owner so orders, and shall not be re-employed unless express permission be given by the Owner. The methods, equipment, and appliances used on the work and the labor employed shall be such as will produce a satisfactory quality of work and shall be adequate to complete the contract within the specified time limit.
- B. In hiring of employees for the performance of work under this Contract, or any Subcontract hereunder, no Contractor or Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of race, sex, creed, or color, discriminate against any citizen of the State of West Virginia in the work to which the employment relates. No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, sex, or color.
- C. The Contractor shall employ or subcontract with licensed electricians experienced with medium-voltage equipment (if applicable), emergency power systems, and generator installation.
- D. The Contractor shall coordinate with a factory-trained startup technician authorized by the manufacturer.
- E. The Contractor shall employ or subcontract with controls personnel who have experience with SCADA interfaces, generator control systems, transfer switch integration.
- F. The Contractor shall employ or subcontract qualified riggers for generator placement and removal.

END OF SECTION 014323

SECTION 014523 – EQUIPMENT TESTING AND FUNCTIONAL VERIFICATION

PART 1 - GENERAL

1.1. GENERAL DESCRIPTION

- A. This Section includes general requirements for the testing and functional verification of equipment and systems furnished and installed under the Contract.

1.2. SUMMARY

- A. Testing and verification shall be performed in accordance with recognized industry standards and as specified in the Contract Documents.

1.3. RELATED DOCUMENTS

- A. Section 013323 – Shop Drawings, Product Data, and Submittals
- B. Section 017517 – Starting of Systems / Commissioning
- C. Section 017901 – Operational Demonstration

1.4. DEFINITIONS

- A. Field Testing:
 - 1. Field Testing is the overall on-site testing phase performed after installation and startup. It includes all testing activities conducted in the field and must be witnessed by the Owner. Field Testing includes, but is not limited to:
 - a. Dry Testing
 - b. Performance Testing
 - c. Operational Demonstration
 - 2. Conform to the specific test requirements as given in individual sections of the Project Manual.
 - 3. Provide all necessary assistance to Owner personnel, at no additional cost to the Owner.

WPCD G1 BP07 Generator Replacement

B. Dry Testing:

1. Dry Testing is performed by the Contractor. It shall consist of mechanical, electrical, instrumentation, and controls testing performed prior to fuel introduction, engine operation, or load testing. The Contractor shall verify:
 - a. Equipment anchorage
 - b. Equipment alignment
 - c. Conduit installation
 - d. Electrical continuity
 - e. Grounding systems
 - f. Control wiring
 - g. Alarm functions
 - h. Interlocks
 - i. Generator control logic
 - j. Transfer switch operation

C. Functional Testing shall verify operation of the complete emergency power system utilizing generator operation and load bank testing where required. Functional testing shall include:

1. Generator startup
2. Generator shutdown
3. ATS transfer
4. ATS retransfer
5. Emergency stop operation
6. Alarm verification
7. Remote monitoring verification
8. Fuel system verification
9. Automatic operation following utility loss

WPCD G1 BP07 Generator Replacement

D. Performance Testing shall verify the following:

1. Generator rated kW output
2. Voltage regulation
3. Frequency regulation
4. Transient response
5. Fuel system performance
6. Cooling system performance
7. Automatic transfer operation
8. Compliance with manufacturer specifications

E. Operational Demonstration: A commissioning activity performed by the Owner during which the Owner operates and maintains a fully functional component, system, or unit process under normal operating conditions to demonstrate compliance with the Contract Documents. The Contractor shall provide on-site supervision, required labor, materials, and technical support throughout the demonstration period.

1.5. SUBMITTALS

A. Quality Control Submittals:

1. Submit Test Reports within 48 hours of the completion, suspension, or termination of the test unless otherwise approved by the Owner. Submit Test Reports per Section 013323 – Shop Drawings, Product Data, and Submittals.
2. Generator shall successfully complete a minimum of four-hour load bank test at loading specified within Division 26 and generator specifications.

B. Project Record Documents:

1. Test, adjustment, and verification data shall be recorded by the Contractor in accordance with the Specifications.

1.6. REGULATORY REQUIREMENTS

A. Comply with all applicable regulatory requirements except where modified by the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. The Contractor shall supply all materials and equipment used in testing, adjusting, and verification.
- B. Materials and equipment used shall be of good quality and suitable for the intended service. The use of miscellaneous items found at the job site is not acceptable.
- C. Select capacity or range of test equipment to provide meaningful test results.

2.2 FABRICATION

- A. The Contractor shall fabricate or provide any necessary temporary equipment used in testing.

2.3 SOURCE QUALITY CONTROL

- A. All test instruments shall be calibrated to recognized standards, traceable to NBS standards, by the instrument manufacturer or a qualified independent calibration laboratory. Submit instrument calibration data for the Contractor's review prior to the test.

PART 3 - EXECUTION

3.1 EXAMINATION AND VERIFICATION OF CONDITION

- A. Verify the equipment, component, or system is completely and correctly installed before beginning tests.
- B. Review the design and installation of the system or equipment to ensure that the proposed test will not result in a hazard to personnel or equipment.

3.2 PREPARATION

- A. Design, fabricate, and install test equipment before commencing the test.
- B. Where required by the Contract Documents, or when required by the Contractor, an approved representative of the manufacturer shall be on site to provide technical direction.
- C. Notify and obtain approval of the Contractor not less than 72 hours prior to each test. See Section 017517, Starting of Systems/Commissioning.

3.3. FIELD QUALITY CONTROL

- A. Submit Test Reports for all tests, successful or unsuccessful, in accordance with Section 013323 – Shop Drawings, Product Data and Submittals.
- B. Test shall be repeated per the General Conditions if results of testing fail to meet test criteria, whether the failure is identified in the field at the time of testing or through Test Report review.

END OF SECTION 014523

SECTION 015213 - FIELD OFFICES

PART 1 - GENERAL

1.1 CONTRACTOR'S OFFICE

- A. Contractor shall provide adequate temporary office, communication, and document storage facilities necessary for management of the Work.
- B. Contractor shall maintain copies of the following at the project site at all times:
 - 1. Contract Documents
 - 2. Approved Submittals
 - 3. Health and Safety Plans (HASP)
 - 4. RFIs (Request for Information)
 - 5. Safety Data Sheets
 - 6. Startup Documentation
 - 7. Commissioning Documentation

1.2 AID TO THE INJURED

- A. The Contractor shall keep in his office and on the work site, all articles necessary for giving "First Aid to the Injured." The Contractor shall also have standing arrangements for the immediate removal and hospital treatment of any employee or other person who may be injured on the work site.

END OF SECTION 015213

SECTION 016600 - PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes requirements for delivery, storage, handling, protection, preservation, inspection, and installation readiness of equipment and materials furnished under this Contract.

PART 2 - DELIVERY AND STORAGE OF MATERIALS

2.1 DELIVERY

- A. The manufacturer shall be responsible for proper packing, protection, and shipment of all furnished equipment contingent upon coordination with the Contractor.
- B. The manufacturer shall coordinate shipment and transfer dates with the Contractor at least thirty (30) calendar days in advance. Risk of loss, damage, or delay shall remain with the manufacturer until the equipment has been transferred and accepted as specified herein.

2.2 INSPECTION AND ACCEPTANCE

- A. Upon transfer to the Contractor or designated delivery location, the Contractor shall inspect the equipment within five (5) business days for damage, shortages, or non-conformance with the Contract Documents. Any deficiencies shall be documented and reported in writing to the Owner and Engineer within the inspection period.
- B. Acceptance shall occur upon written confirmation that all identified deficiencies have been corrected or resolved. Title to and risk of loss of the equipment shall be transferred to the Contractor upon acceptance.
- C. Following transfer and acceptance, the Contractor shall be responsible for storage, handling, and protection of the equipment in accordance with the Final O&M Manuals and applicable Contract Documents.

PART 3 - EXECUTION

3.1 MAINTENANCE OF STORAGE

- A. The Contractor shall preserve and protect the equipment in accordance with approved Manufacturer's preservation requirements.
- B. Generator equipment shall be stored in accordance with manufacturer's recommendations and protected from:
 - 1. Moisture
 - 2. Corrosion
 - 3. Dust
 - 4. Physical Damage
 - 5. Unauthorized operation
- C. The Contractor shall implement and maintain a documented storage inspection and maintenance program to ensure that equipment remains in a condition acceptable for installation and warranty compliance. At a minimum, the program shall include the following:
 - 1. Storage Facilities: Maintain storage areas that provide the environmental conditions required by the Manufacturer, including protection from weather, moisture, dust, contamination, and physical damage.
 - 2. Environmental Monitoring: Monitor and maintain environmental conditions, including temperature, humidity, and cleanliness, within limits specified by the Manufacturer.
 - 3. Protection from Deterioration: Protect equipment from corrosion, ultraviolet exposure, biological growth, and other adverse environmental effects.
 - 4. Maintenance and Servicing: Perform periodic inspection, maintenance, and servicing of equipment in accordance with the Manufacturer's written instructions for long-term storage.
 - 5. Manufacturer Requirements: Maintain and follow all Manufacturer-provided storage, handling, and preservation instructions for each item. Ensure such instructions remain readily available at the storage location.
 - 6. Electrical Equipment Preservation: Energize and operate space heaters and other preservation devices provided with electrical equipment continuously, unless otherwise directed in writing by the Manufacturer. Space heaters shall remain

WPCD G1 BP07 Generator Replacement

energized continuously while equipment is in storage whenever recommended by the manufacturer.

7. Fuel system components shall remain capped, sealed, and protected from contamination until installation.
- D. Upon receipt of equipment, the Contractor shall establish and maintain written records of all storage inspections and maintenance activities. Such records shall be kept current and shall be made available to the Engineer and Owner upon request.
- E. Records of inspections, environmental conditions, servicing activities, and corrective actions shall be maintained and transferred with the equipment for inclusion in the Final O&M Manual.

END OF SECTION 016600

SECTION 016617 – EQUIPMENT MAINTENANCE DURING CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section provides general requirements for the maintenance of equipment in the field. Storage maintenance requirements are provided by Section 016600, Product Handling and Protection. Specific maintenance requirements are provided by manufacturers per individual Sections in the Project Manual.
- B. Maintenance is performed to ensure delivery to the Owner of equipment in an undeteriorated and fully serviceable condition.
- C. Maintenance activities described in this Section are intended solely to preserve the equipment's condition prior to installation and commencement of the Warranty period.
- D. All manufacturer warranties for equipment shall commence only after installation, start-up, and acceptance under the separate Construction Contract, in accordance with the requirements of the Contract Documents governing that Construction Contract. Nothing in this Section shall be interpreted to initiate, extend, diminish, or otherwise affect warranty obligations.
- E. This Section applies to the generator set, automatic transfer equipment, generator controls, starting batteries and chargers, engine auxiliaries, fuel-system components furnished under this Contract, associated electrical equipment, and other equipment identified in the individual technical Sections.

1.2 RELATED SECTIONS

- A. Section 016600, Product Handling and Protection.

1.3 DEFINITIONS

- A. Storage maintenance consists of establishing and maintaining the environment required by the stored materials and performing periodic servicing.
- B. Preventive maintenance consists of activities performed on a periodic basis to maintain operating or operational items or equipment.

WPCD G1 BP07 Generator Replacement

- C. Corrective maintenance consists of correcting faults or failures in an item or equipment. This may include adjustments or replacement of defective parts.

1.4 SUBMITTALS

- A. The Maintenance Log shall be submitted to the Owner upon completion of the Operational Demonstration and prior to commencement of the equipment Warranty period under the Contract.
- B. The Maintenance Log shall include:
 - 1. Equipment identification and serial number
 - 2. Delivery and installation dates
 - 3. Manufacturer-required maintenance interval
 - 4. Date performed
 - 5. Work performed
 - 6. Materials or parts used
 - 7. Name and signature/initials of technician
 - 8. Deficiencies found and corrective actions taken
 - 9. Battery voltage or condition checks
 - 10. Battery-charger status
 - 11. Heater operation
 - 12. Fluid levels
 - 13. Fuel-system condition
 - 14. Exercise or run-event documentation
 - 15. Alarm history, if applicable.

PART 2 - PRODUCTS

2.1 COMPONENTS, ACCESSORIES, AND REPAIR PARTS

- A. All components, accessories, and repair parts used in maintenance shall be supplied by or approved by the equipment manufacturer for use on the equipment.

2.2 SOURCE QUALITY CONTROL

- A. All parts and materials used in maintenance shall meet the quality control requirements provided for the item or equipment. These are specified in individual Sections of the Project Manual.

PART 3 - EXECUTION

3.1 EXAMINATION AND VERIFICATION OF CONDITION

- A. The Contractor shall prepare a Maintenance Log for all equipment.
 - 1. This log shall include a list of required maintenance services and inspections, as provided by the manufacturer and submitted under individual Sections of the Project Manual.
 - 2. The Maintenance Log shall include checklists for the periodic services and inspections required.
 - 3. The Contractor shall initial and date the requisite log entries upon completion of the individual servicing or inspection.
 - 4. The Maintenance Log shall be located in the Contractor's Field Office and shall be available for review by the Owner until it is submitted for record purposes upon completion of the Operational Demonstration and the start of the Warranty period.

3.2 PREPARATION

- A. Before removing an item from storage per Section 016600, the Contractor shall review the installed location. Protection and services at the installed location must meet the equipment storage requirements.

WPCD G1 BP07 Generator Replacement

- B. Before moving equipment to the installed location, the Contractor shall have available materials for temporary shelter or services required to establish the proper storage environment after the equipment is installed until it is placed in service in its final operating environment.

3.3 PERFORMANCE OF MAINTENANCE

- A. The Contractor shall perform all storage, preventive maintenance, and inspections required by the manufacturer at the specified intervals during the Construction Contract.
- B. Promptly investigate and correct deterioration, damage, alarm conditions, leakage, corrosion, loss of charge, improper environmental conditions, or other deficiencies identified by the Contractor, Owner, Engineer, or manufacturer's representative. When necessary, the Contractor shall perform corrective maintenance. This shall be performed at no cost to the Owner. Corrective maintenance shall be performed per the Manufacturer's written instructions or at the direction of the approved manufacturer representative.
- C. The Contractor shall restore equipment to its operating condition before start-up.
- D. Warranty obligations, coverage periods, and warranty enforcement shall be governed exclusively by the Construction Contract Documents and shall not begin until equipment has been installed, commissioned, and accepted under that Contract
- E. When the equipment warranty becomes effective under the separate Construction Contract, the Owner will assume responsibility for maintenance in accordance with the Construction Contract Documents.
- F. Do not operate, exercise, energize, or place the generator system in automatic mode without authorization required by Section 017517 and coordination with the Owner.
- G. Construction-period maintenance required by this Section does not commence, extend, reduce, or otherwise modify the specified warranty. The date on which the warranty commences shall be determined exclusively by the applicable Contract Documents. Upon transfer of maintenance responsibility to the Owner, furnish the complete Maintenance Log and identify the first manufacturer-recommended maintenance activity due after transfer.

END OF SECTION 016617

SECTION 017517 - STARTING OF SYSTEMS/COMMISSIONING

PART 1 - GENERAL

1.1. DESCRIPTION OF WORK

- A. This Section includes general requirements for the commissioning of the Work and start-up and operation of systems and equipment.

1.2. SUMMARY

- A. Starting, testing, and operating the completed Work including systems and equipment until Substantial Completion is achieved and operation of the completed Work including systems or equipment are accepted by the Owner. Contractor shall cooperate and coordinate with the Owner in the operation, maintenance, and adjustment of the Work.

1.3. RELATED SECTIONS

- A. Section 013323 – Shop Drawings, Product Data and Samples
- B. Section 017901 – Operational Demonstration
- C. Section 017902 – Instruction of Owner's Personnel
- D. Section 016617 – Maintenance
- E. Section 467331 – Dewatering Equipment

1.4. DEFINITIONS

- A. Commissioning: Commissioning is a series of activities or processes, necessary to ensure that systems and equipment are designed, installed, functionally tested, started up, and capable of being operated and maintained to perform in conformity with the design intent for the facility improvements. Commissioning includes, but is not limited to, factory testing, field testing, dry testing, wet testing, performance testing, manufacturer's checkout, start-up, and Operational Demonstration.
- B. Field Testing: Field Testing is performance testing, operational testing, or documentation verification conducted in the field after installation, to provide comparison with the results obtained in the Factory Testing.
- C. Dry Testing: Dry Testing is performed by the Contractor without introducing either process material or other test material into the component, system, or unit process.
- D. Wet Testing: Wet Testing is testing performed by the Contractor utilizing test material in the component, system, or unit process. Tankage shall be filled with test material to operating level.

WPCD G1 BP07 Generator Replacement

- E. Performance Testing: Performance Testing is performed by the Contractor to demonstrate system performance in accordance with the Project Manual requirements.
- F. Manufacturer's Check-Out: Field inspection, testing, adjustments, and sign off by the approved representative of the Manufacturer, indicating that the component, system, or unit process meets the manufacturer's requirements.
- G. Start-Up: Narrowly defined as placing a component, system, or unit process on-line. Start-up can be a commissioning activity or a normal operating activity.
- H. Operational Demonstration: A commissioning activity performed by the Owner during which the Owner operates and maintains a fully functional component, system, or unit process under normal operating conditions to demonstrate compliance with the Contract Documents. The Contractor shall provide on-site supervision, required labor, materials, and technical support throughout the demonstration.

1.5. SUBMITTALS

- A. Quality Control Submittals:
 - 1. Field Installation Reports – Submit reports by Manufacturer's Representative in accordance with Paragraph 3.3 of this Section.
- B. Commissioning Documentation: Contractor shall prepare and submit all documentation for review and approval. The documentation shall include, but not be limited to, the following:
 - 1. Verify field conditions: Confirm all dimensions, elevations, clearances, and utilities locations affecting the Work.
 - 2. Certification by the preparer that he/she is the person responsible for the data, and that the data is authentic and accurate.
 - 3. Certification by the Contractor or equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance: and that the equipment or unit process systems are suitable for Performance Testing.
 - 4. Pertinent background information shall include, but not be limited to, the following:
 - a. Equipment or unit process systems Started-Up and Commissioned
 - b. Start-Up and Commissioning dates
 - c. Items or performance criteria tested clearly showing requirements and field data that verify requirements were met.
 - d. Names of witnesses for Start-Up and Commissioning.
 - e. Any repairs, corrections, or modifications required for the equipment or unit process systems to successfully complete Start-Up and Commissioning.

WPCD G1 BP07 Generator Replacement

- f. Loop diagrams accurately depicting the installed condition of instrumentation and controls.
 - g. Any other important background information.
- 5. Appendix
 - a. A summary of all data used in the calculation, including source, formulas with all terms defined.
 - b. Calculations for all data submitted, fully defined.
 - c. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.
 - d. Production and/or operational data.
 - e. Calibration procedures and worksheets for sampling equipment.
 - f. Copies of calibration records for instrumentation.
 - g. PLC Ladder logic documented with comments.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1. EXAMINATION AND VERIFICATION OF CONDITION

- A. The Contractor shall inspect systems and equipment prior to each start-up and verify their readiness for start-up. Conditions hazardous to equipment or personnel shall be corrected by the Contractor prior to start-up of equipment.
 - 1. Start-up operations shall not proceed using temporary power or temporary instrumentation and control wiring. All electrical and control connections shall be permanent and complete, and all such electrical components and equipment fully functional.
 - 2. Use of repair parts during start-up operations shall not be permitted, except in such situations where the actual on-site verification of such repair parts' operability is specified.
 - 3. The Contractor shall verify that all initial copies of the Maintenance and Operating Instructions have received an acceptable disposition as defined in Section 013323, and the only outstanding item is the field verification of the Instructions.
- B. On successful completion of Start-up, process flows, and solids shall be used for commissioning the equipment and unit process systems to show the equipment and unit process systems function properly. Commissioning shall confirm the proper operation of the equipment and unit process systems with process fluids and process solids; adjustments shall be made, and the equipment or unit process systems shall be optimized and brought into compliance with design criteria in preparation for Operational Demonstration.

WPCD G1 BP07 Generator Replacement

- C. The Contractor shall coordinate all Start-up and Commissioning activities for equipment and unit processes. The Contractor shall develop a detailed start-up and commissioning plan that includes the following as a minimum:
 - 1. Description of the overall general start-up and commissioning process.
 - 2. List of equipment and unit process systems included for start-up and commissioning activities.
 - 3. Detailed start-up and commissioning sequence of activities.
 - 4. Listing of staff and responsibilities for activities.
 - 5. Contractor shall use a form that will be provided by the Owner.

3.2 PREPARATION

- A. Prior to start-up of equipment or systems, all necessary test equipment shall be in place and operable.
- B. Approved representative(s) of the Manufacturer and Contractor shall be present for the initial start-up of systems or equipment.
- C. The Contractor shall request permission to start-up equipment, including electrical gear, and notify the Owner using a standard Start-Up Request form.
 - 1. The Start-Up Request shall be submitted to the Owner a minimum of 72 hours before the scheduled start-up. Requests shall be made during normal working hours.
 - 2. The Contractor shall provide all information in the first Section of the Start-Up Request form.
 - 3. The Owner will indicate approval or disapproval of the request.
 - 4. Approval of the request is based solely on impact on plant operations. Approval does not relieve the Contractor of any responsibility for plant and personnel safety.
 - 5. The Contractor shall obtain the approved Start-Up Request prior to the system or equipment start-up.
 - 6. If training is to be conducted in conjunction with the start-up this should be indicated on the Start-Up Request form. All requirements of Section 017902, Instruction of Owner's Personnel must be met for training sessions.
 - 7. Start-ups performed at the direction of the Contractor, per paragraph 3.3(G) of this Section, do not require advance notification to the Engineer.
- D. Normal installation checks, such as for rotation, are not considered start-ups and do not normally require start-up notification. For all equipment and systems so designated in the Contract Documents, or so designated by the Engineer, such checks shall be under the supervision of the approved representative of the manufacturer and shall be reviewed by the Engineer.

1. All electrical apparatus which is energized shall be clearly marked.

3.3 CONDUCT OF START-UP AND COMMISSIONING

A. Start-up:

1. All initial start-ups of equipment or systems shall be performed under the technical direction of the approved representative of the manufacturer.
2. Any lack of readiness of associated systems or failure of a system or equipment previously started prior to the date of Final Completion of the Project shall require additional initial start-up service to be performed, under the direction of the approved representative of the manufacturer.
3. The Contractor shall repair, replace or modify any equipment or system which fails to perform as specified in the Contract Documents. Such repair, replacement or modification of deficient work shall be performed under the terms of the General Conditions.
4. During the Operational Demonstration period per Section 017901, Operational Demonstration and at other times when the system is on-line and an integral part of the Wastewater Treatment Plant operations and process, start-ups shall be performed as required by the Contractor.

- B. The Contractor shall be responsible for commissioning all work. Final acceptance shall be by the Owner.

- C. The Contractor is responsible for the performance and operation of the systems and equipment during commissioning.

- D. When Owner personnel are operating systems or equipment, the Contractor shall make available, at all times, persons knowledgeable about the systems or equipment to direct the Owner personnel in its operation.

- E. The Contractor shall make all adjustments and corrections necessary to achieve normal, stable operation of systems. Adjustment and corrections shall be in accordance with Section 016617, Maintenance.

- F. Any failures of equipment or systems operated under the direction of the Contractor shall be considered deficiencies and shall be corrected in accordance with the General Conditions.

- G. During the Operational Demonstration period as defined in Section 017901, Operational Demonstration and at other times, the work will be on-line and an integral part of the Wastewater Treatment Plant operations and process. The Owner maintains control of Wastewater Treatment Plant operations and processes at all times. Therefore:

1. The Contractor shall not commence, resume, terminate, or suspend the operations without the permission of the Owner and only in a sequence and manner suitable to the Owner.

WPCD G1 BP07 Generator Replacement

2. The Contractor shall immediately, on a 24-hour per day, 7-day per week basis, adjust or repair any malfunction in the work which in the opinion of the Owner jeopardizes or may jeopardize the proper operation of the Wastewater Treatment Plant.
3. The Contractor shall not start-up, shut down, adjust, or otherwise alter the operation of any component, system, or unit process without the permission of the Owner except in the case of an emergency and in accordance with the General Conditions.

3.4. QUALITY CONTROL

A. Reports of the Approved Representative of the Manufacturer:

1. The approved representative of the manufacturer shall prepare a daily report on each site visit for each system or item of equipment inspected, adjusted, started up, or worked on.
2. The report shall state the purpose of the visit, the representative's observations and conclusions, and recommendations for further visits or action.
3. The reports shall be submitted in accordance with Section 013323, Shop Drawings, Product Data and Samples within three (3) days of the visit.

END OF SECTION 017517

SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. The following forms and related sign-offs shall be documented in accordance with the provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before the final retainer is approved for release. Forms for Items A to G will be attached to the Contractor's executed copy of the contract.
 - 1. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).
 - 2. Contractor's Certification of Completion except for accepted punch-list items.
 - 3. Consent of Surety Company to Final Payment
 - 4. Affidavit or certification that payrolls, bills for materials and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied.
 - 5. Affidavit establishing the Final Acceptance Date and correction period.
 - 6. Final releases or waivers of liens and claims, when required by the Contract Documents.
 - 7. Build America, Buy America certifications and supporting documentation required by the Contract Documents.
 - 8. Final warranties, bonds, maintenance agreements, training records, testing and commissioning records, spare-parts inventories, and other closeout submittals required by the individual Specification Sections.
 - 9. Final Operation and Maintenance Manuals in accordance with Section 017823.
 - 10. Record Drawings and other project records in accordance with Section 017839.
- B. Do not submit a prevailing-wage affidavit unless prevailing-wage requirements are expressly included elsewhere in the Contract Documents.
- C. Before the Owner will approve and accept the work and release the retainer, the Contractor will furnish the Owner a written report indicating the resolution of any and all property damage claims filed with the Contractor by any party during the construction period. The information to be supplied shall include, but not be limited to, the name of the claimant, date filed with Contractor, name of insurance company and/or adjuster handling

WPCD G1 BP07 Generator Replacement

claim, how the claim was resolved, and if the claim was not resolved for the full amount, a statement indicating the reason for such action.

- D. If no claims were received, submit a signed statement confirming that no property-damage claims are outstanding.
- E. Acceptance of required closeout submittals is a condition precedent to Final Completion and final payment.
- F. Inaccurate, incomplete, or nonconforming closeout documentation may be returned for correction and may delay Final Completion or release of retainage at no additional cost to the Owner.

END OF SECTION 017800

SECTION 017821 - CLEANING AND PROTECTION

PART 1 - GENERAL

1.1 GENERAL

- A. Provide continuous cleaning, final cleaning, restoration, and protection of the Work and existing facilities affected by construction.
- B. Keep the site, access routes, occupied plant areas, generator building, electrical rooms, and work areas free of debris, waste, standing water, combustible materials, and unsafe accumulations.
- C. Maintain the operating wastewater treatment facility in a clean and safe condition. Prevent dust, debris, liquids, and foreign material from entering active equipment, electrical gear, controls, drains, process piping, sewers or ventilation equipment.
- D. Coordinate cleaning and protection with the Owner so plant operations, emergency power readiness, access, and security are not impaired.
- E. On or before the completion date for the work, the Contractor shall tear down and remove all temporary structures built by him, all construction plant used by him, and shall repair and replace all parts of existing embankments, fences, or other structures which were removed or injured by his operations or by the employees of the Contractor. The Contractor shall thoroughly clean out all buildings, sewers, drains, pipes, manholes, inlets, and miscellaneous and appurtenant structures, and shall remove all rubbish, leaving the grounds in a neat and satisfactory condition.
- F. As circumstances require and when ordered by the Engineer, the Contractor shall clean the road, driveway, and/or sidewalk on which construction activity under this contract has resulted in dirt or any other foreign material being deposited with an automatic self-contained mechanical sweeper with integral water spray, vacuum, and on-board or supplementary containment.
- G. Failure to comply with this requirement when ordered by the Engineer or his representative may serve as cause for the Engineer to stop the work and to withhold any monies due the Contractor until such order has been complied with to the satisfaction of the Engineer.
- H. As the work progresses, and as may be directed, the Contractor shall remove from the site and dispose of debris and waste material resulting from his work. Particular attention shall be given to minimizing any fire and safety hazard from form materials or from other combustibles as may be used in connection with the work, which should be removed daily.

WPCD G1 BP07 Generator Replacement

- I. The Contractor shall wash all windows and other glass surfaces, leaving all areas free from putty marks, paint, etc.
- J. During and after installation, the Contractor shall furnish and maintain satisfactory protection to all equipment against injury by weather, flooding, or breakage, thereby permitting all work to be left in a new condition at the completion of the contract.

END OF SECTION 017821

SECTION 017823 - OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies preparation, review, approval, transfer, and delivery of Operation and Maintenance Manuals for equipment furnished and installed under the Contract.
- B. For equipment procured and installed under this Contract, the Contractor is responsible for both preliminary and final manuals, including coordination of manufacturer content and incorporation of as-installed information.
- C. If the Owner separately procures equipment, the approved preliminary manual furnished by the Owner or Supplier becomes an interface document. The Contractor shall verify receipt, identify omissions affecting installation, and incorporate the information into the Final O&M Manual.

1.2 DEFINITIONS

- A. Preliminary O&M Manual: Manufacturer and supplier information available before shipment, used for storage, handling, installation planning, coordination, startup planning, and review.
- B. Final O&M Manual: Consolidated, project-specific documentation reflecting the equipment as furnished, installed, tested, started, commissioned, and accepted.

1.3 PRELIMINARY O&M MANUAL SUBMITTAL

- A. Submit electronically not less than 30 calendar days before scheduled shipment unless an earlier date is required by the approved submittal schedule. Equipment shall not be released for shipment until the manual receives an acceptable disposition from the Engineer.
- B. Organize by equipment tag and system. Include, as applicable:
 - 1. Manufacturer, model, serial-number format, equipment tag, and complete equipment and appurtenance list.
 - 2. Functional descriptions, ratings, materials of construction, utility requirements, and performance guarantees.

WPCD G1 BP07 Generator Replacement

3. Handling, lifting, receiving, storage, preservation, space-heater, battery, lubrication, and periodic rotation or exercise requirements.
 4. Installation, alignment, anchorage, grouting, connection, clearance, ventilation, and environmental requirements.
 5. General arrangement, assembly, schematic wiring, piping, instrumentation, control, and communication diagrams available before installation.
 6. Factory test procedures and results, certified performance data, and nameplate data.
 7. Startup, adjustment, normal operation, shutdown, emergency operation, emergency shutdown, and troubleshooting instructions.
 8. Preventive maintenance procedures and schedules; lubrication chart; required tools; recommended consumables; and spare-parts list.
 9. Safety precautions, hazard information, and lockout/tagout considerations provided by the manufacturer.
 10. Warranty terms and manufacturer service contact information.
- C. Provide only project-applicable information. Clearly mark applicable models, options, ratings, and accessories in multi-product literature.
- D. An unacceptable or incomplete preliminary manual is a nonconformance and may delay shipment or payment at no additional cost to the Owner.
- 1.4 FINAL O&M MANUAL SUBMITTAL
- A. Submit electronically not later than 60 calendar days after successful commissioning and before Final Completion.
- B. Update preliminary content and include, as applicable:
1. Final equipment list with installed model and serial numbers.
 2. As-built drawings, field wiring diagrams, final piping diagrams, and approved shop drawings.
 3. Final control logic, sequence of operation, communication settings, network addresses, relay settings, protective-device settings, and instrument calibration data.

WPCD G1 BP07 Generator Replacement

4. Startup, field test, load-bank test, performance, commissioning, and acceptance records.
 5. Generator and fuel-system operating instructions, alarm and shutdown matrix, ATS interfaces, synchronizing or master-controller information, and SCADA/communications documentation furnished under the Contract.
 6. Warranty certificates, service agreements, training records, spare-parts inventory, and supplier contacts.
 7. Storage duration, conditions, inspections, preservation activities, servicing, and deviations from manufacturer requirements before installation.
 8. Final preventive-maintenance program and task schedule for installed service.
- C. Resolve conflicts between manufacturer literature and site-specific information. Site-specific, as-installed information accepted by the Engineer shall govern.
- D. Acceptance of the Final O&M Manuals is a condition precedent to Final Completion and final payment.

1.5 FORMAT

- A. Submit searchable electronic PDF files with bookmarks and a table of contents. Use separate files or clearly bookmarked volumes by system when file size or usability warrants.
- B. Upon approval, provide one hard copy and the final electronic files. Print on 8-1/2 by 11 inch sheets, with larger drawings folded to that size.
- C. Revise manuals to incorporate Engineer comments and prior accepted submittal dispositions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 017839 - PROJECT RECORDS, DRAWINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Maintain and submit Record Drawings and other record documents showing the Work as actually installed.

1.2 RECORD DOCUMENTS

- A. Maintain at the site one current record copy of the Contract Drawings, Specifications, Addenda, approved submittals, field directives, change documentation, test records, and other documents necessary to show changes to the Work.
- B. Keep record documents clean, legible, current, and available for review by the Owner and Engineer. Update them as the Work progresses and before work is concealed.

1.3 RECORD DRAWINGS

- A. Legibly mark deviations from the Contract Drawings, including actual locations, dimensions, elevations, routing, and connection points for concealed or changed Work.
- B. Record, as applicable:
 - 1. Generator, fuel tank, day tank, fuel piping, vents, drains, containment, bollards, fencing, and equipment-pad locations and elevations.
 - 2. Conduit, cable, grounding, control wiring, communications wiring, raceways, pull boxes, and equipment connections, including concealed routing.
 - 3. Final equipment tags, panel and circuit designations, protective-device settings, ATS connections, controller interfaces, network or communication connections, and SCADA points furnished under the Contract.
 - 4. Changes to louvers, wall or roof penetrations, supports, curbs, flashing, and restoration.
 - 5. Field changes made by Addendum, Change Order, Engineer directive, approved shop drawing, or coordination with existing conditions.

WPCD G1 BP07 Generator Replacement

- C. Where exact information cannot be shown graphically, provide keyed notes, sketches, photographs, schedules, or supplemental details.

1.4 SUBMITTAL

- A. Submit Record Drawings for Engineer review before Final Completion. Do not defer delivery until after final acceptance.
- B. Submit one complete, coordinated electronic PDF set. Where editable source files are required elsewhere in the Contract Documents, submit them in the specified native format.
- C. Contractor certification: Submit a signed statement that the record documents are complete and accurately reflect the Work as installed, based on information available to the Contractor and its subcontractors.
- D. Correct incomplete or illegible record documents and resubmit. Acceptance of Record Drawings does not relieve the Contractor from responsibility for conformance with the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 017901 – OPERATIONAL DEMONSTRATION

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION

- A. Work Included: A demonstration of the operation of all systems is required. This Operational Demonstration shall be conducted, coordinated, and recorded by the Contractor in accordance with the requirements specified herein.
- B. Where requirements of this Section conflict with or supplement Section 017517, Starting of Systems and Commissioning, the more stringent requirement shall govern. Operational Demonstration requirements are in addition to, and do not replace, commissioning requirements.
- C. Completion of commissioning or Operational Demonstration shall not be construed as Final Acceptance nor as commencement of any warranty period.

1.2 SUMMARY

- A. This Section includes requirements for planning, conducting, documenting, and accepting the Operational Demonstration of the Work.
- B. The Operational Demonstration is in addition to any other installation, shop, and factory testing, field testing, performance testing, balancing, or adjustments required elsewhere in the Contract Documents.

1.3 RELATED SECTIONS

- A. Section 017517 - Starting of Systems and Commissioning
- B. Section 263213 – Engine Generators
- C. Section 262413 – Transfer Switches
- D. Section 260800 – Commissioning of Electrical Systems (if included)

1.4 DEFINITIONS

- A. Operational Demonstration: A commissioning activity performed by the Owner during which the Owner operates and maintains a fully functional component, system, or unit process under normal operating conditions to demonstrate compliance with the Contract Documents. The Contractor shall provide on-site supervision, required labor, materials, and technical support throughout the demonstration period
- B. Stable Operation: Operation of the component, system, or unit process at design operating conditions, with all mechanical, electrical, instrumentation, and control systems functioning as intended, and without unplanned shutdowns or performance instability, for a minimum continuous period acceptable to the Owner.
- C. Operational Demonstration Log: Chronological record documenting system status, adjustments, outages, and test results during the demonstration period.
 - 1. The operation log shall include all changes in status or system parameters, adjustments, and results of tests.
 - 2. Entries shall be made, noting the date and time, at the occurrence of each event.
 - 3. Operational Demonstration Logs shall be on a form acceptable to the Owner.

1.5 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Operational Demonstration log per subparagraph 3.4.A of this Section.
 - 2. Report of Operational Demonstration per subparagraph 3.4.B.2 of this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION AND VERIFICATION OF CONDITION

- A. Prior to initiating the Operational Demonstration, verify that
 - 1. Construction is complete and does not interfere with normal operation.

WPCD G1 BP07 Generator Replacement

2. Startup and commissioning per Section 017517 are complete.
3. Repair parts, maintenance materials, and manuals are delivered
4. Required training has been completed. Training for Operations, Electrical, Instrumentation, and Maintenance Personnel shall be completed before the Operational Demonstration.

3.2 PREPARATION

- A. The Contractor shall assign two (2) qualified representatives—one (1) primary and one (1) alternate—for the duration of the Operational Demonstration. The Contractor's representatives shall be fully authorized and responsible for providing continuous on-site supervision and for promptly responding to and correcting any operational issues, deficiencies, or service calls that arise during the Operational Demonstration. The Contractor shall ensure representatives are available at all times during system operation.
- B. Submit start-up notification to the Owner per Section 017517, Starting of Systems and Commissioning.

3.3 OPERATIONAL DEMONSTRATION

- A. The Owner will perform the Operational Demonstration of the Work after approval of Start-Up and completion of commissioning activities in accordance with Section 017517, Starting of Systems and Commissioning.
- B. The Operational Demonstration shall consist of not less than eight (8) continuous hours of successful operation of each generator system under normal operating conditions and simulated utility outage conditions, including automatic start, transfer, loading, cooldown, and shutdown sequences.
- C. Startup activities, cleaning cycles, or stabilization time shall not be counted.
- D. Contractor shall provide on-site supervision and required labor throughout the demonstration.
- E. Contractor shall furnish all fuel, lubricants, load-bank equipment, testing instrumentation, and technician support required for Operational Demonstration.
- F. During the Operational Demonstration, the Owner shall retain control of overall plant operations and processes. The Contractor shall remain fully responsible for system performance, compliance with the Contract Documents, supervision of operation, and the

WPCD G1 BP07 Generator Replacement

prompt correction of any deficiencies or malfunctions. Owner personnel will operate the Work under the direction and supervision of the Contractor.

- G. Start-up and operation of the system and all associated equipment shall be in accordance with the Initial Maintenance and Operating Instructions, which have received an acceptable disposition from the Owner. If deviations from these instructions are necessary, these shall be noted in the Operational Demonstration Log and subsequently submitted as revisions to the Maintenance and Operating Instructions.
- H. All required maintenance and servicing prior to the Date of Substantial Completion shall be performed by the Contractor at the specified interval and as necessary. All maintenance and service shall be provided in the Operational Demonstration Log.
- I. All outages of equipment, system(s), or the plant should be noted in the Operational Demonstration Log. Plant outages are considered a part of normal plant operation and will not invalidate the Operational Demonstration. The Contractor is responsible for the safe and orderly shutdown and restart of equipment as necessary in the event of an outage. Outage time is not to be included in the Operational Demonstration period.
- J. The Contractor shall attend operational coordination meetings as called by the Owner to review operating conditions of equipment and systems.
- K. If, during the Operational Demonstration, any portion of the Work fails to conform to the requirements of the Contract Documents, the Operational Demonstration shall be deemed to have failed. The Owner shall notify the Contractor in writing. The Contractor shall correct all deficiencies and restart the full Operational Demonstration period at no additional cost to the Owner.
- L. Upon failure, correct deficiencies and restart the full demonstration period at no additional cost to the Owner.
- M. During the Operational Demonstration, the Owner may require or permit the Operational Demonstration to be suspended:
 - 1. As provided in the General Conditions.
 - 2. Upon the written request of the Contractor to correct or adjust the work when, in the judgment of the Owner, such required correction or adjustment is insufficient to deem the Operational Demonstration to have failed.
 - 3. If the Operational Demonstration is suspended for any reason except failure, Operational Demonstration time shall accrue to the work from the beginning of the Operational Demonstration to the time of the suspension.

WPCD G1 BP07 Generator Replacement

N. The Generation Operational Demonstration will demonstrate:

1. Automatic start upon simulated utility failure
2. Automatic transfer switch operation
3. Generator acceptance of load
4. Stable voltage regulation
5. Stable frequency regulation
6. Alarm functionality
7. Shutdown functionality
8. Remote monitoring functionality
9. SCADA communications (if applicable)
10. Return-to-utility sequence
11. Cool-down cycle
12. Automatic reset

3.4 REPORTING

- A. Submit daily logs to the Owner by 9:00 a.m. the following day.
- B. Within 14 days after completion, submit an Operational Demonstration Report for approval, detailing:
1. Equipment utilized
 2. Chemical utilized
 3. Deviations from approved procedures described in the approved Operation and Maintenance Manuals.
- C. A report of the Operational Demonstration shall describe the equipment utilized and any repairs, modifications, adjustments, or other work performed during the demonstration period.

END OF SECTION 017901

SECTION 017902 - INSTRUCTION OF OWNER'S PERSONNEL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide complete instruction and training for the Owner's permanent operating personnel regarding the proper operation, maintenance, and safety of all equipment furnished under the Contract. Training shall be sufficient to enable safe, reliable, and warranty-compliant operation of the equipment.
- B. Training requirements specific to individual equipment items are included in the applicable technical Sections of the Contract Documents.
- C. Training shall be conducted using the approved Operation and Maintenance (O&M) Manuals specified in Section 017823.

1.2 SUMMARY OF WORK

- A. Except as otherwise specified, work under this Section includes preparation of Lesson Plans and conduct of comprehensive training for all equipment provided under the Installation Contract.
- B. Training sessions and duration shall be in accordance with the equipment manufacturer's recommendations; however, not fewer than two (2) training sessions shall be provided to accommodate multiple shifts. Training shall include, at a minimum, instruction in operation, maintenance, and electrical/instrumentation systems.
- C. Training required by this Section constitutes part of the Work and shall be fully completed prior to Final Acceptance and prior to recommendation of Final Payment
- D. Related Sections
 - 1. Section 013323 – Shop Drawings, Product Data, and Submittals
 - 2. Section 016600 – Product Storage and Handling Requirements
 - 3. Section 017823 – Maintenance Manuals
 - 4. Section 017901 – Operational Demonstrations

1.3 DEFINITIONS

- A. Lesson Plan: A submittal describing the instructional objectives, training outline, instructor qualifications, instructional methods, audiovisual requirements, training materials, and proposed schedule for each training session.
- B. Training Aid: A mock-up, model, sample, or other device used to demonstrate equipment operation or maintenance.

1.4 SUBMITTALS

- A. Submit training-related submittals in accordance with Section 013323.
- B. The Contractor shall submit the following:
 - 1. Training Schedule: A proposed training schedule for the entire Contract, showing tentative dates, number of sessions, duration, and subject matter for each training session.
 - 2. Instructor's Credentials: Detailed credentials of each proposed instructor, including name, education, experience, training qualifications, and employment history with the equipment manufacturer. Credentials shall demonstrate specific experience with the operation and maintenance of the equipment being taught. Instructor credentials shall be submitted no less than sixty (60) days prior to the commencement of training.
 - 3. Lesson Plans: Lesson Plans shall be submitted no less than sixty (60) days prior to the commencement of training. Lesson Plans shall be consistent with the approved O&M Manuals and shall address all equipment components, regardless of manufacturer. Include at a minimum:
 - a. Title page with project, equipment, and Contractor information
 - b. Instructional objectives
 - c. Detailed training outline
 - d. Method of instruction
 - e. Training duration and session breakdown
 - f. List of training materials and aids
 - g. Evaluation or verification of training completion
- C. Lesson Plans shall clearly identify training categories (operations/maintenance, electrical and instrumentation, or system), session description, duration, and format. The training shall include, as a minimum:
 - 1. Electrical and Instrumentation Training – System Equipment Overview:
 - a. Describe the system (equipment), fundamental operating principles, and dynamics.
 - b. Identify the system's (equipment's) mechanical, electrical, and electronic components and features. Review system (equipment) wiring diagrams and process and instrumentation diagrams.
 - c. Identify support systems (equipment) associated with the operation (e.g., air intake filters, valve actuators, motors).
 - d. Identify and describe safety precautions and potential hazards related to maintenance.
 - e. Identify and describe in detail safety and control interlocks.

WPCD G1 BP07 Generator Replacement

- f. Identify and describe alarm conditions and response to alarms.
 - g. Cover the supply of power to process equipment and related appurtenances, lighting, etc.
 - h. Cover low voltage controls, monitoring devices, etc.
 - i. Emergency generator theory of operation
 - j. Engine systems
 - k. Fuel systems
 - l. Cooling systems
 - m. Starting systems
 - n. Governor systems
 - o. Paralleling and synchronizing (if applicable)
 - p. Load management
 - q. Emergency operation procedures
2. Electrical and Instrumentation Training – Equipment Preventive Maintenance (PM) and Equipment Troubleshooting:
- a. Describe PM inspection procedures required to perform an inspection of the equipment in operation, spot potential trouble symptoms, anticipate breakdowns, and forecast maintenance requirements (predictive maintenance).
 - b. Define the recommended PM intervals for each component.
 - c. Provide lubricant and replacement part recommendations and limitations.
 - d. Describe appropriate cleaning practices and recommend intervals.
 - e. Identify and describe the use of special tools required for maintenance of the equipment.
 - f. Describe component removal and installation, and disassembly and assembly procedures.
 - g. Perform at least 2 "field" demonstrations of preventive maintenance procedures.
 - h. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
 - i. Define recommended torque settings, mounting, calibration, and alignment procedures and settings, as appropriate.
 - j. Describe recommended procedures to check or test equipment following a corrective repair.

WPCD G1 BP07 Generator Replacement

3. Electrical and Instrumentation Training – Equipment Troubleshooting:
 - a. Define recommended systematic troubleshooting procedures.
 - b. Provide component-specific troubleshooting checklists.
 - c. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
 4. Maintenance and Operation Training: System (Equipment) Overview
 - a. Describe the system (equipment) operating (process) function and performance objectives.
 - b. Describe the system (equipment) fundamental operating principles and dynamics.
 - c. Identify the system's (equipment's) mechanical, electrical, and electronic components and features.
 - d. Identify support systems (equipment) associated with the operation (e.g., air intake filters, valve actuators, motors).
 - e. Identify and describe safety precautions and potential hazards related to the operation.
 - f. For systems (equipment) comprised of several components: Identify and describe in detail each component's function. Where applicable, group related components into subsystems. Describe subsystem functions and their interaction with other subsystems.
 - g. Identify and describe in detail safety and control interlocks.
 - h. Preventative maintenance
 5. Operation and Maintenance Training – Operation of Equipment and Troubleshooting:
 - a. Describe operating principles and practices.
 - b. Describe routine operating, start-up, and shutdown procedures.
 - c. Describe abnormal or emergency start- up, operating, and shutdown procedures that may apply.
 - d. Describe alarm conditions and responses to alarms.
 - e. Describe routine monitoring and record-keeping procedures.
 - f. Describe recommended housekeeping procedures.
 - g. Describe how to determine if either corrective maintenance or an operating parameter adjustment is required.
- D. Training Materials: Provide sufficient copies of instructional materials for all attendees at the first training session. Provide two (2) copies of all audiovisual aids. Video materials should be submitted on a thumb drive in AVI or MPEG format.

WPCD G1 BP07 Generator Replacement

- E. Provide a minimum of 4 hours Operations Training, 4 hours Electrical Training, 4 hours Maintenance Training for a minimum total training of 12 hours.
- F. Approval of training submittals does not relieve the Contractor of responsibility for complete and compliant training

PART 2 - PRODUCTS

2.1 QUALIFICATIONS OF INSTRUCTOR

- A. Instructors shall be experienced and knowledgeable in the operation and maintenance of the equipment and familiar with its application for this Project
- B. The Owner reserves the right to reject Instructors who do not meet these qualifications. Replacement of rejected Instructors shall be at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION AND VERIFICATION OF CONDITION

- A. The training site for the classroom instruction will be provided by the Owner. The Owner will provide this location.
- B. Prior to training, the Contractor shall verify that
 1. Equipment is ready for Operational Demonstration in accordance with Section 017901, Operational Demonstration.
 2. Construction required for all operating modes is complete.
 3. Training areas are adequately lit, safe, and unobstructed.
 4. Training activities will not conflict with active construction operations.
 5. Required training material and aids are available.
 6. Required representatives from interfacing Contractors or suppliers are present.

3.2 PREPARATION

- A. Training facilities for classroom instruction will be provided by the Owner. The Contractor shall provide all required audiovisual equipment and training aids.
- B. Training may be submitted for continuing education approval if the Owner elects to seek CEU/CH credit.
- C. All training sessions shall be recorded by the Contractor. Contractor shall verify acceptable sight lines, lighting, and participant locations prior to the start of training.

WPCD G1 BP07 Generator Replacement

- D. Training shall begin within 45 days prior to the start of the Operational Demonstration Period, unless otherwise approved. Contractor shall plan for multiple Owner shifts.

3.3 CONDUCT OF TRAINING

- A. Training shall be coordinated with startup, commissioning, and Operational Demonstration activities and conducted at times approved by the Owner.
- B. Training shall reflect actual installed conditions and be consistent with the approved Final O&M Manuals.
- C. Cover operation, maintenance, electrical, and instrumentation topics consistent with approved Lesson Plans
- D. All topics identified in the approved Lesson Plans shall be covered in sufficient detail to permit Owner personnel to safely operate and maintain the equipment under all anticipated conditions. Warranty-related maintenance requirements shall be explicitly addressed.
- E. Provide a minimum 30-minute break for any training session exceeding three (3) hours.
- F. Training shall be attended by the Owner's personnel and by other parties designated by the Owner.

3.4 EVALUATION AND COMPLETION

- A. Immediately following training, provide evaluation forms to Owner personnel. Collect completed evaluation forms and attendance sheets and submit originals to the Owner.
- B. If training is determined to be incomplete or deficient, or if instructors are unable to adequately respond to questions, provide additional training at no additional cost to the Owner.
- C. Training shall be completed prior to Final Acceptance.
- D. Training shall be considered complete only after all required sessions are conducted, materials are delivered, and attendance documentation is submitted.

END OF SECTION 017902

SECTION 018000 - SYSTEM PERFORMANCES

PART 1 - GENERAL

1.1 GENERAL

- A. It is the intent of this Contract that the completed installation shall be fully functional, properly integrated, and complete in all respects.
- B. The Contractor shall provide all labor, materials, equipment, and incidentals necessary to place the emergency generators into continuous, reliable operation in accordance with the Contract Documents.
- C. The Contractor shall be responsible for all minor details, required for a complete and operable system, whether or not specifically shown on the Drawings or listed in these Specifications, unless such items are clearly identified as being furnished under the separate Equipment Procurement Contract.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. All facilities, systems, and equipment installed under this Construction Contract shall function properly and in accordance with the Drawings, Specifications, and applicable industry standards. Systems shall operate as an integrated whole and shall meet all performance requirements specified in the technical Sections.
- B. The Contractor is responsible for all work required to install, integrate, and commission the equipment, as well as ensure that each generator:
 - 1. Starts automatically upon loss of power
 - 2. Reaches rated voltage and frequency within manufacturer limits
 - 3. Supplies connected loads without nuisance trips
 - 4. Successfully transfers load through the ATS equipment
 - 5. Operates continuously at rated loads
 - 6. Maintains voltage and frequency regulation in accordance with manufacturer specifications
 - 7. Returns automatically to utility operation

1.3 EQUIPMENT AND SYSTEMS INCLUDED

- A. The following systems are included in the performance requirements of this Section:
1. Engine generators
 2. Fuel storage and transfer systems
 3. Day tanks
 4. Exhaust systems
 5. Starting systems
 6. Generator control panels
 7. Automatic transfer switches
 8. Switchgear interfaces
 9. Protective relays
 10. Distribution equipment modifications
 11. Grounding systems
 12. Communication systems
 13. Instrumentation and SCADA Integration
- B. The Contractor is responsible for all work necessary to place the Owner-furnished equipment into proper operating condition, including installation, alignment anchorage, piping and electrical connections, system integration, testing, and commissioning.
- C. Field Acceptance Testing. Generators shall successfully complete:
1. Manufacturer startup
 2. Functional testing
 3. Automatic transfer testing
 4. Alarm testing
 5. Shutdown testing
 6. Load-bank testing

WPCD G1 BP07 Generator Replacement

7. Integrated system testing

D. Recommended load-bank test minimum:

1. 25%
2. 50%
3. 75%
4. 100%

1.4 CERTIFICATION

A. The Contractor shall obtain and submit written certification from the Manufacturers confirming that:

1. Equipment has been installed in accordance with the Manufacturer's written instructions
2. Equipment is properly aligned, anchored, and connected.
3. Equipment is ready for startup, testing, and commissioning,
4. All required field adjustments have been completed.

B. Certification shall be submitted prior to Performance Testing and Operational Demonstration.

END OF SECTION 018000

SECTION 026500 - REGULATED UNDERGROUND STORAGE TANK CLOSURE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Bid Documents, General and Supplementary Conditions, and other Contract Documents apply to the Work of this Section.

1.2 SUMMARY

- A. This Section includes permanent closure of the existing active regulated diesel-fuel underground storage tank (UST), associated piping and appurtenances, closure assessment activities, regulatory coordination and reporting, and closure-in-place or removal as specified.
 - 1. The existing UST is a nominal 4,000-gallon regulated diesel-fuel tank. Contractor shall consider the tank capacity, associated excavation requirements, and restoration impacts for closure and removal activities.
- B. Base Bid: Complete regulatory closure in place, including notifications, shutdown, product and sludge removal, vapor purging, tank cleaning, piping abandonment, closure assessment sampling, laboratory analyses, inert fill placement, waste disposal, restoration, record documentation, and closure reporting.
- C. Alternate No. 1: Complete UST removal and disposal, including associated accessible piping, anchors, appurtenances, excavation backfill, and restoration.
- D. Contingency: Pre-approved contaminated soil management allowance, paid by unit price per ton of contaminated soil removed and disposed.
- E. The completed Work shall be suitable for acceptance by the Owner and applicable regulatory authorities. Contractor shall provide incidental labor, materials, equipment, excavation, temporary controls, and documentation necessary for complete closure.

1.3 REFERENCES

A. Comply with the latest applicable editions of the following:

1. 40 CFR Part 280.
 2. West Virginia Code and 33 CSR 30, Underground Storage Tank Regulations.
 3. API Recommended Practice 1604.
 4. API Recommended Practice 2016.
 5. WVDEP underground storage tank closure guidance and required closure forms.
- B. Where requirements conflict, promptly notify the Engineer and comply with the more stringent requirement unless directed otherwise in writing by the authority having jurisdiction.

1.4 REGULATORY COORDINATION

- A. Owner remains the regulatory owner of record unless otherwise established in the Contract Documents.
- B. Contractor shall provide information and assistance necessary for regulatory notifications and shall coordinate the Work with the Owner, Engineer, and WVDEP.
- C. Do not begin permanent closure activities until required notices have been submitted and applicable waiting periods, inspections, and authorizations have been satisfied.
- D. Cooperate with WVDEP and other authorized inspection personnel. Schedule closure work to permit required observations and inspections.

1.5 QUALITY ASSURANCE

- A. UST closure activities shall be performed under the supervision of a currently certified WVDEP Class B UST worker.
- B. Use personnel experienced in regulated UST closure, petroleum-waste management, excavation safety, vapor monitoring, sampling, and documentation applicable to the Work.
- C. Use a laboratory acceptable under applicable WVDEP requirements for required analyses.

1.6 SUBMITTALS

- A. Submit the following before commencing closure activities:
 - 1. Current WVDEP Class B certification documentation.
 - 2. Closure work plan and sequence.
 - 3. Site-specific health and safety plan.
 - 4. Soil and groundwater sampling plan.
 - 5. Waste handling, transportation, and disposal plan.
 - 6. Identification and acceptance documentation for proposed disposal and recycling facilities.
 - 7. Laboratory qualifications or accreditation information.
 - 8. Product data for inert fill material proposed for closure in place.
 - 9. Calibration records or certifications for combustible-gas and oxygen-concentration instruments.
- B. Submit closeout documents required by Paragraph 3.10.

1.7 JOB CONDITIONS

- A. Utilities: Determine locations of underground utilities before excavation and coordinate protection or relocation in accordance with Contract requirements and applicable law.
- B. Work Area: Confine operations, staging, stockpiling, excavation, and restoration to approved work areas and maintain Owner operations and emergency access.
- C. Site Access: Provide access to the Owner, Engineer, and regulatory personnel for observation and inspection.
- D. Fire and Explosion Prevention: Keep ignition sources away from the work area. Use suitable bonding, grounding, ventilation, and explosion-protected equipment. Smoking and open flames are prohibited within 100 feet of tank, excavation, and stockpile areas.
- E. Excavation Protection: Provide barriers, barricades, and other controls necessary to prevent unauthorized entry and protect persons and property.

1.8 PROJECT COORDINATION

- A. Assign a qualified project coordinator to serve as liaison among Contractor, Owner, Engineer, certified UST personnel, laboratory, haulers, disposal facilities, and regulatory authorities.
- B. Maintain daily records of closure activities, field measurements, inspections, samples, waste shipments, and significant incidents.

1.9 AUTHORITY TO STOP WORK

- A. Owner or Engineer may stop Work when hazardous conditions or noncompliance with the Contract Documents or applicable requirements is observed. Resume Work only after corrective measures are accepted and written authorization to proceed is provided. Contractor bears costs attributable to its unsafe practices or noncompliance.

PART 2 – PRODUCTS

2.1 INERT FILL MATERIAL

- A. For closure in place, provide clean sand, flowable fill, foam fill, bentonite grout, or other inert fill accepted by the Engineer and regulatory authority.
- B. Fill material shall be compatible with the tank and site conditions and capable of completely filling tank voids without leaving unsupported spaces.

2.2 SPILL PREVENTION AND RESPONSE MATERIALS

- A. Provide drip pans, petroleum-compatible absorbents, non-sparking tools where required, overpack or storage containers, labeled drums, and other materials necessary to prevent and control releases during piping disconnection, tank cleaning, excavation, or removal.

2.3 MONITORING EQUIPMENT

- A. Provide calibrated combustible-gas and oxygen-concentration instruments appropriate for tank atmosphere and excavation monitoring. Maintain instruments in operating condition throughout the Work.

PART 3 – EXECUTION

3.1 PRE-CLOSURE ACTIVITIES

- A. Conduct preliminary site review, utility coordination, regulatory coordination, and preconstruction meeting before shutdown.
- B. Remove fuel, sludge, tank bottoms, and other recoverable materials. Drain associated piping without spilling product. Containerize, label, transport, and dispose of recovered materials lawfully.
- C. Disconnect or isolate the UST system from service and secure piping and appurtenances against leakage or unauthorized use.

3.2 PURGING, CLEANING, AND ATMOSPHERIC MONITORING

- A. Purge tank vapors and clean the tank interior in accordance with approved procedures and applicable API safety guidance.
- B. Vent displaced vapors safely and prevent accumulation of flammable vapors at grade, in excavations, buildings, sewers, or other confined areas.
- C. Continuously or regularly monitor the tank atmosphere and surrounding work area, as appropriate to the operation, for combustible vapors and oxygen concentration. Maintain a combustible-gas indicator in service during tank handling and removal activities.
- D. Do not perform cutting, opening, entry, lifting, or removal until atmospheric conditions comply with the approved health and safety plan and applicable requirements.
- E. Maintain tank-cleaning and atmospheric-monitoring records.

3.3 CLOSURE ASSESSMENT

- A. Perform closure assessment and collect soil and groundwater samples as required by applicable regulations, WVDEP closure guidance, and the approved sampling plan.
- B. Sampling shall be supervised by certified personnel. Preserve sample integrity, complete chain-of-custody documentation, and submit samples to the accepted laboratory.
- C. Document sample locations, field observations, analytical methods, results, and conditions encountered.

3.4 RELEASE DISCOVERY

- A. Immediately notify Owner and Engineer upon discovery of contaminated soil, free product, contaminated groundwater, petroleum vapor impacts, or analytical exceedances.
- B. Protect and preserve affected areas pending direction. Do not undertake remediation beyond authorized Contract Work without written authorization.

WPCD G1 BP07 Generator Replacement

- C. Implement immediate measures required to protect health, safety, property, and the environment, and document those measures.

BASE BID - REGULATED UST CLOSURE IN PLACE

3.5 CLOSURE IN PLACE

- A. After cleaning and completion of closure assessment activities, disconnect and abandon associated piping as required, secure tank penetrations, and fill the tank completely with approved inert material.
- B. Base Bid shall include labor, materials, equipment, testing, disposal, restoration, notifications, documentation, and reporting necessary for regulatory acceptance of closure in place.
- C. Proceed with closure in place only when permitted by the authority having jurisdiction. If removal is required or directed, perform Alternate No. 1 only upon written authorization and in accordance with the Contract pricing provisions.

ALTERNATE NO. 1 - COMPLETE UST REMOVAL

3.6 COMPLETE UST REMOVAL

- A. Remove the UST completely, including accessible associated piping, anchors, and appurtenances.
- B. After confirming acceptable atmospheric conditions, excavate around and lift the tank using methods that prevent tank rupture, release, and damage to adjacent facilities.
- C. Place removed tank on a stable level surface, block against movement, clean as required for transport, and secure it with vents oriented safely.
- D. Transport and dispose of or recycle the tank and wastes in accordance with applicable requirements. Provide receipts, manifests, and certificates of disposal or recycling.
- E. Backfill excavation with approved clean material, compact as required, and restore pavement, concrete, lawn, grading, drainage, and other disturbed improvements to preconstruction condition or better.

WPCD G1 BP07 Generator Replacement

- F. Provide a separate lump sum price for Alternate No. 1.

CONTINGENCY - CONTAMINATED SOIL MANAGEMENT ALLOWANCE

3.7 CONTAMINATED SOIL MANAGEMENT

- A. Upon written authorization, excavate, load, transport, and dispose of contaminated soil at an accepted facility.
- B. Measurement and payment unit: Ton of contaminated soil removed and disposed.
- C. Unit price shall include excavation, handling, stockpile controls, loading, transportation, disposal fees, manifests, receipts, and incidental Work.
- D. Quantities are not guaranteed and shall be used only upon Owner authorization. Replace removed material and restore the site under the applicable authorized Work.

END OF SECTION 026500

SECTION 030000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - 1. Section 013326.01 - Quality Control Plans

1.2 SUMMARY

- A. Provide all materials and labor necessary to complete all concrete, plain and reinforced, as indicated on Drawings or as specified in these specifications and as required to complete the Project. Work, without limiting the generality thereof, includes:
 - 1. Installation of concrete to provide footings, foundations, foundation walls, slabs on grade, and other incidental concrete Work.
 - 2. Furnishing and installation of admixtures.
 - 3. Finishing of concrete as specified herein or as indicated on Drawings.
- B. This Section specifies cast-in place concrete, including form work, reinforcing, mix design, placement procedures and finishes.
 - 1. Extent of concrete work is shown on drawings.
 - 2. Concrete paving and walks are specified in Division 2.
 - 3. Mechanical finishes and concrete floor toppings are specified in other Division-3 sections.

1.3 SUBMITTALS

- A. See Section 013323 - Shop Drawings, Product Data, And Samples for submittal procedures.
- B. Product Data: Submit data for proprietary materials and items, including but not limited to, repair mortar, concrete mix design data, Portland cement, fly ash, reinforcement, forms, forming accessories, bonding agent, admixtures, patching compounds, waterstops, joint systems, high strength repair/patching mortar, control joint/construction joint locations, curing compounds, dry-shake finish materials, and others as requested by Engineer.
 - 1. Mix Design: Submit each proposed concrete mix design. The concrete mix design shall provide the following data:
 - a. The expected strength.
 - b. Corresponding slump before and after the introduction of mid- or high-range water-reducing admixtures.
 - c. Weights and test results of the ingredients.
 - d. Concrete mix compressive strength test results.

WPCD G1 BP07 Generator Replacement

- e. Other physical properties necessary to review each mix design for conformance with these specifications.
 - f. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - g. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- 2. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- C. Shop Drawings; Reinforcement: Submit original shop drawings prepared for fabrication, bending, and placement of concrete reinforcement. Comply with ACI Detailing Manual showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests.
 - 1. The proposed mix design submittal(s) shall follow the procedures of Chapter 5, Sections 5.2 to 5.3 of ACI-318.
 - 2. Reference should be made to ACI-211.5R "Guide for Submittal of Concrete Proportions" for the required submittal information. Sample forms for presenting the necessary information can be found in the addendum at the end of this section. Example Form B should follow a completed Example A in the submittal when laboratory trial batches are used to document a water-cementitious materials ratio curve.
 - 3. Additional data summarizing the past performance records should be an integral part of the submittal if the submittal is based on past performance with the proposed materials and proportions.
 - 4. Alkali-silica reactivity test results.
- E. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, latest revisions, except where more stringent requirements are shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
 - 4. ACI 347 "Guide to Form work for Concrete."
 - 5. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

WPCD G1 BP07 Generator Replacement

6. ACI 232.3R - Report on High-Volume Fly Ash Concrete for Structural Applications.
 7. ACI 305R - Guide to Hot Weather Concreting.
 8. ACI 305.1 (305.1M) - Specification for Hot Weather Concreting.
 9. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 10. ACI 306R - Guide to Cold Weather Concreting.
 11. ACI 308.1 (308.1M) - Specification for Curing Concrete.
 12. ACI 350.5 (350.5M) - Specifications for Environmental Concrete Structures.
 13. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 14. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
 15. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 16. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 17. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 18. ASTM C150/C150M - Standard Specification for Portland Cement.
 19. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
 20. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
 21. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 22. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 23. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
 24. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- B. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- C. Engage a testing agency acceptable to Engineer to perform initial material evaluation and certification tests for mix designs and to design concrete mixes.
- D. Pre-installation Conference: Conduct conference at project site to comply with requirements of Division 1 Section "Project Meetings" and the following:
1. At least 35 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials, inspection, testing and certifications. Require representatives of each entity directly concerned with

WPCD G1 BP07 Generator Replacement

cast-in-place concrete to attend conference, including, but not limited to, the following:

- a. Contractor's Superintendent
 - b. Agency responsible for concrete design mixes.
 - c. Agency responsible for field quality control.
 - d. Ready-mix concrete producer.
 - e. Concrete Subcontractor
 - f. Primary admixture manufactures.
- E. Concrete Testing Service: Employ and pay an independent testing laboratory, acceptable to the Owner and Architect to perform material evaluation tests and to review concrete mix designs proposed by Contractor to conform to this Specification.
- F. Alkali-Silica Reactivity Testing: Aggregates used in the concrete shall be tested by an independent testing agency for alkali-silica reactivity in accordance with ASTM C1260.

1.5 PROJECT CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301, ACI 306.1, and as follows:
1. Protect concrete Work from physical damage or reduced strength caused by frost, freezing actions, or low temperatures.
 2. 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.
 3. Do not use frozen materials or materials containing ice or snow.
 4. Do not place concrete in contact with surfaces less than 35 deg. F, other than reinforcing steel.
 5. 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 ACI 305.1, and as follows:
1. Maintain concrete temperature at time of discharge not to exceed 95 deg. F.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- C. Protect adjacent finish materials against spatter during concrete placement.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

WPCD G1 BP07 Generator Replacement

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two (2) edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. (Flat sheets only)
- D. Welded Deformed Steel Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.
 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
 3. For the bottom of slabs that are exposed to sanitary liquids, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II, I/II, V low alkali, and ASTM C 595 blended cement Type IP for typical structures and Type HS for environmental structures.
 1. Blended cements that include ASTM C 1157 cements shall not be permitted
 2. Use one brand of cement throughout project, unless otherwise acceptable to Engineer.
 - a. Different types of cement shall not be mixed or used alternately without specific written approval by the Engineer.
 - b. Different brands of cement may be used when authorized in writing by the Engineer. A resubmittal will be required if different brands are proposed during the Project.
 3. Portland cement shall contain less than 0.60 percent alkalis. Portland-pozzolan cement shall be low alkali.

WPCD G1 BP07 Generator Replacement

- B. Concrete mixtures shall include either fly ash or slag as shown below, but within the limits stipulated in 2.4.C, unless the proposed combination of cementitious materials has been tested in accordance with ASTM C 1012 and resulted in expansion of not more than 0.10 percent at 6 months.
1. Fly Ash, conforming to ASTM C618, Class F. Limit use of fly ash to not exceed 30% or less than 20% of cementitious material by weight.
 - a. Fly ash pozzolan shall contain less than 1 percent by weight of carbon and less than 3 percent by weight of sulfur trioxide.
 - b. Alkali content (%Na₂O_{eq}) less than 3.0%.
 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120: Limit use of granulated blast-furnace slag to not exceed 65% or less than 40% of cement content by weight.
 3. The pozzolan supplied during the life of the project shall have been formed at the same single source. The pozzolan color shall not substantially alter the resulting concrete from the normal gray color and appearance.
- C. Normal Weight Aggregates: Fine and coarse aggregates shall conform to ASTM C33. Fine and coarse aggregates shall be regarded as separate ingredients.
1. Aggregates shall be non-reactive and shall be washed before use. Provide aggregates from a single source for exposed concrete.
 2. Tests for size and grading of fine and coarse aggregates shall be in accordance with ASTM C136. Combined aggregates shall be well and uniformly graded from coarse to fine sizes to produce a concrete that has optimum workability and consolidation characteristics. The final combined aggregate gradation shall be established during the design mix.
 3. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 4. Local aggregates not complying with ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Engineer.
 5. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3-mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3 mm).
- D. Fine aggregate: Fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine. Gradation shall conform to ASTM C33.
- E. Coarse aggregate: Coarse aggregate shall be hard, angular (not river washed), dense and durable gravel or crushed rock free from injurious amounts of soft and friable particles, alkali, and organic matter. Other deleterious substances shall not exceed the limits listed in ASTM C33, Table 3. Gradation of each coarse aggregate size shall conform TO ASTM C33, Table 2.

WPCD G1 BP07 Generator Replacement

- F. Water: Conform with ASTM C94. Water for washing aggregate, for mixing and for curing shall be potable and free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1,000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO₄; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the concrete at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the concrete.
- G. Admixtures shall be compatible with the concrete and with each other. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the concrete mix.
1. Prohibited Admixtures: Calcium chloride thiocyanates or admixtures containing more than 0.1 percent chloride ions are not permitted.
- H. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Air-Mix"; Euclid Chemical Co.
 - b. "Sika Aer"; Sika Corp.
 - c. "MB-VR or MB-AE"; Master Builders.
- I. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1 percent chloride ions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "WRDA"; W.R. Grace.
 - b. "Eucon WR-75"; Euclid Chemical Co.
 - c. "Pozzolith Normal"; Master Builders.
- J. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F and containing not more than 0.1 percent chloride ions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Sikament 300"; Sika Chemical Corp.
 - b. "Eucon 37"; Euclid Chemical Co.
 - c. "Rheobuild or Polyheed"; Master Builders.
- K. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1 percent chloride ions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Accelguard 80"; Euclid Chemical Co.
 - b. "Pozzutec 20"; Master Builders.
 - c. "Daraset"; W.R. Grace & Co.
- L. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and containing not more than 0.1 percent chloride ions.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Pozzolith"; Master Builders.

WPCD G1 BP07 Generator Replacement

- b. "Eucon Retarder 75"; Euclid Chemical Co.
- c. "Plastiment"; Sika Chemical Co.

2.4 RELATED MATERIALS

- A. Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- B. Non-Shrink Non-metallic Grout: CRD-C 621 and ASTM C-1107, factory pre-mixed grout.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Non-metallic
 - 1) "Set Grout"; Master Builders.
 - 2) "Euco-NS"; Euclid Chemical Co.
 - 3) "Five Star Grout"; U.S. Grout Corp.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane- forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg./sq. m. when applied at 200 sq ft./gal.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Masterkure"; Master Builders.
 - b. "Ecocure"; Euclid Chemical Co.
 - c. "Horn Clear Seal"; A.C. Horn, Inc.
- F. Bonding Compound: Epoxy base.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sikadur-32 Hi-Mod; Sika USA
 - b. Armatec-110 EpoCem; Sika USA
 - c. Dural 452 Gel; Euclid Chemical Co.
 - d. Dural 452 MV; Euclid Chemical Co.
 - e. REZI-WELD; W. R. MeadowsEpoxy
- G. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Epoxite Binder 2390"; A.C. Horn, Inc.
 - b. "Sikadur 32 Hi-Mod"; Sika Chemical Corp.
 - c. "Euco Epoxy 452 or 620"; Euclid Chemical Co.

- H. High Strength Repair/Patching Mortar: Contractor can, either provide a batch/site mix or a premanufactured bag mix. See Table I for a batch/site mix.
1. Premanufactured bag mix shall be polymer modified shrinkage compensated, rapid setting, high strength mortar specifically formulated to make structural repairs in vertical and overhead applications.
 2. Bag mix shall conform to ASTM C928 R2 for structural concrete repair and have a 28-day strength of at least 6,000 psi.
 3. Bag mix may be extended with aggregate if approved by manufacturer.
 4. The following are approved manufacturers:
 - a. Sika Chemical Corp.
 - b. Five Star Products. Inc
 - c. Euclid Chemical Company
 - d. CTS Cement Manufacturing Corp.
 - e. Dayton Superior Corporation
 - f. SpecChem

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301 and ACI 211. If the trial batch method is used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Engineer.
1. Concrete shall be normal weight concrete composed of specified cement, pozzolan, admixtures, aggregates and water proportioned and mixed to produce workable, strong, dense, and impermeable concrete.
 2. The Contractor may substitute Portland-pozzolan cement conforming to ASTM C595, containing the specified pozzolan content, in lieu of separately batching Portland cement and pozzolan. Pozzolan may be omitted from concrete exposed only to normal atmospheric conditions and from concrete not in contact with soil or liquid. The maximum water-cementitious materials ratio shall be based on the combined weight of cement and pozzolan in the concrete mixture.
 3. Controlled Low Strength Material (CLSM) shall be a flowable concrete slurry mix, consisting of cement, pozzolan, water, coarse and fine aggregate. The concrete slurry mix shall be produced by a ready-mix concrete supplier.
- B. Submit written reports to Engineer and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer.

WPCD G1 BP07 Generator Replacement

- C. Design mixes to provide normal weight concrete with the following properties, as indicated in Table I.:

TABLE 1
CONCRETE REQUIREMENTS

Concrete Class	ASTM Coarse Aggregate Size	Maximum Water/Cement Ratio	Pozzolan, Percent by Weight of Cementitious Materials ^a	Minimum Air Content (Percent)	Minimum ^b 28-Day Compressive Strength, PSI	Slump Range Min-Max /Admix ^e (Inches)
A	57	0.4	20-28	5.5 ^c	5000	3-4/8
B	467 ^d	0.45	20-28	5.5 ^c	3500	4-5/8
C	8	0.48	20-28	5.5	3000	5-6/9
D	57	0.42	20-28	5.5 ^c	5000	3-4/8
G	78 ^j	0.45	-	-	3000	7 ⁱ
M	78 ^j	0.40	5-25	5.5	5500	3-4/5
F	57 ^h	1.33 ^h	10-30 ^h	15 ^h	300 ⁱ	8 ^h

a Pozzolan content may be included in cementitious fraction. Based on the fly ash ratios, for GGBFS pozzolan shall be multiplied by 1.75.

b Compressive strength shall be determined at the end of 28 days based on test cylinders made and tested in accordance with ASTM C39.

c Plus or minus 1.5 percent.

d ASTM coarse aggregate gradation 57 may be substituted at Contractor's option.

e Min and max represent slump due to water only. Admix refers to recommended maximum slump for the mix after the incorporation of water reducing admixtures.

h Contractor to determine.

i Plus or minus 25 psi.

j Contractor may submit proposed substitutions for Engineer's approval.

1. Typical cast-in-place structural concrete shall be Class A, except as otherwise specified or shown on the drawings.
2. Sitework, non-structural concrete (sidewalks, curbs, pavers, etc.) shall be Class B unless otherwise noted on the drawings.
3. Not Used.
4. Not Used.
5. Not Used.
6. Not Used.
7. Controlled Low Strength Material (Flowable Controlled-Density Fill), if required, shall be Class F.

- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

- E. Admixtures:

1. Use high range water-reducing admixture (super plasticizer) in Classes A and D concrete unless noted otherwise.

WPCD G1 BP07 Generator Replacement

2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
3. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content within limits shown in Table I.
4. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
5. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as shown in Table I:
 - a. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.

2.6 CONCRETE MIXING

- A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixers of one cu. yd., or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd., or fraction thereof.
 1. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
 1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
 - a. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- C. Prepare design mixtures for each type of concrete required.
 1. The inclusion of either fly ash or slag in the concrete mix is mandatory.
 2. Where fly ash is used:
 - a. The minimum fly ash content shall be 20 percent, and the maximum shall be 30% of cementitious material by weight.
 - b. Additional fly ash shall not be included in concrete mixed with blended cements.
 1. Where slag is used:
 - a. The minimum slag content shall be 50 percent and the maximum shall be 65% of cementitious material by weight.
 - b. Additional slag shall not be included in concrete mixed with blended cements.

2.7 PRODUCT DATA

A. MANUFACTURER'S DATA:

1. Copies of manufacturer's data shall be provided for the following:
 - a. Cement
 - b. As-delivered concrete strength, slump, temperature, and air content
 - c. Final laboratory report.

B. READY-MIXED CONCRETE TRUCK DELIVERY TICKETS:

1. Each load of ready-mixed concrete delivered to the job site shall be accompanied by a delivery ticket showing the information listed in ASTM C94, Section 16.
2. With each load of concrete delivered to the job there shall be furnished by the ready mixed concrete producer duplicate delivery tickets, one for the Contractor and one for the Engineer. Delivery tickets shall provide the following information:
 - a. Date and serial number of tickets;
 - b. Name of ready mixed concrete plant;
 - c. Job location;
 - d. Contractor;
 - e. Type and brand name of cement;
 - f. Mix number or specified cement content in bags per cubic yard of concrete;
 - g. Truck number;
 - h. Time dispatched stamped by a time clock;
 - i. Amount of concrete in load in cubic yards;
 - j. Admixtures in concrete, if any;
 - k. Maximum size of aggregate;
 - l. Water added to the job, if any;
 - m. Slump of concrete ordered

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- A. Design, erect, support, brace, and maintain form work to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct form work so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain form work construction tolerances complying with ACI 347.
- B. Design form work to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
- C. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for

WPCD G1 BP07 Generator Replacement

openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- E. Provide temporary openings where interior area of form work is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades: Provide openings in concrete form work to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retightening forms and bracing after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER INSTALLATION

- A. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6" and seal with manufacturer's recommended mastic or pressure-sensitive tape.

3.4 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement by form work, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

WPCD G1 BP07 Generator Replacement

- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer.
 - 1. Provide a roughen interface with a 1/4", min, amplitude at construction joints in walls, slabs, and between walls and footings.
 - 2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.
- B. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
- C. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
- D. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use inserts 1/4 of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic strips into fresh concrete until top surface of strip is flush with slab surface.
 - 2. Follow the directions of Insert Manufacturer for finishing the slab and joints.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. Electrical conduit shall not be embedded in concrete.
- B. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.

WPCD G1 BP07 Generator Replacement

Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- B. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- C. Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel form work is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Preplacement Inspection: Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
 - 1. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions and guard against spattering during placement.
- B. General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
 - 1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete

WPCD G1 BP07 Generator Replacement

that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

- D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position on chairs during concrete placement operations.
- E. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C), and not more than 80 deg F (27 deg C) at point of placement.
 - a. The concrete shall be maintained within this temperature range for not less than seven (7) days.
 - 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 or against cold reinforcing steel.
 - 3. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
- F. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineers.

3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed; provide smooth rubbed finish to smooth form finish. Refer to "Concrete Surface Repairs."
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment.
 - 1. Scarify or roughen entire surface by grinding or similar effective means.
 - 2. Combine one part of Portland cement with 1-1/2 parts fine sand by volume and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
 - 3. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
 - 4. Repeat the above process if necessary to fill voids or bug holes and obtain a consistent match to adjacent surfaces, subject to acceptance of the Engineer.
- D. Grout Cleaned Finish: Provide grout cleaned finish on scheduled concrete surfaces which have received smooth form finish treatment.
 - 1. Scarify or roughen entire surface by grinding or similar effective means.
 - 2. Apply Thoroseal plaster mix coating by Thoro System Products or approved equivalent with an approximate thickness of 1/8-inch to 1/4-inch.
 - 3. Follow the manufacturer's recommendations and guidelines regarding surface preparation, application methods and curing.
 - 4. Repeat the above process if necessary to fill voids or bug holes and obtain a consistent match to adjacent surfaces, subject to acceptance of the Engineer.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smoothly and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
 - 1. After placing slabs, plane surface to tolerances for floor flatness F(F) 15 and floor levelness F(L) 13, measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of F(F) 18 F(L) 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of F(F), 20 and F(L) 17, measured according to ASTM E1155. Grind smooth surface defects which would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- F. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.
 - 1. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.

2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

3.11 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete from rapid moisture loss before and during finishing operations.
 1. The evaporation graph, Figure 1, of ACI 308 - Curing Concrete, shall be used to determine the evaporation rate during concrete placement. If the rate of evaporation equals or exceeds 0.2 lbs/sq.ft./hr., steps shall be taken to prevent excessive evaporation from the surface.
 2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
 - a. Initial curing may be any of the methods listed herein that maintain a satisfactory moisture content and temperature.
 3. Begin final curing procedures, if they differ from initial curing, immediately following initial curing and before concrete has dried. Continue curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of all structural concrete as herein specified.
 1. Provide moisture curing by following methods.
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
 2. Provide moisture-cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- C. Provide curing and sealing compound to pavement, walks, and curbs only, as follows:
 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours) and after surface water sheen has disappeared. Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
- D. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

WPCD G1 BP07 Generator Replacement

- E. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by moist curing methods.
 - 1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.12 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new form work.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer.

3.13 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
 - 1. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled. Cure concrete as herein specified.
- E. Reinforced Masonry: Provide concrete grout conforming to ASTM C476 for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.14 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.
 - 1. Saw-cut out honeycomb, rock pockets, voids over 1/4" in any dimension, down to solid concrete but, in no case to a depth of less than 1." Make edges of cuts slightly

WPCD G1 BP07 Generator Replacement

undercut to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

WPCD G1 BP07 Generator Replacement

ADDENDUM
EXAMPLE FORM A

CONCRETE SUPPLIER: _____

PROJECT: _____ CONTRACTOR: _____

MIXTURE ID: _____ SPECIFIED f'_c : _____ PSI

MATERIAL MIXTURE PROPORTIONS lbs-mass/cu.yd. (pcy)

1.0 Cement Type _____
Source: _____

Sp. Gr. _____ pcy
_____ cu. ft.

1.1 Other Cementitious Materials: _____ Class: _____ Source: _____

Sp. Gr. _____ pcy _____ cu.
ft.

2.0 Aggregate (No. 1) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ a
ft.

Dry Rodded Unit Wt.: _____ pcf

Alternate (No. 1) Lightweight Aggregate Type: _____ Size: _____ Source: _____

Sp. Gr. Factor _____ over dry pcy _____ cu. ft.

Loose Unit Wt. _____ pcf Estimated Wet _____ pcf

2.1 Aggregate (No. 2) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ cu. ft.

Dry Rodded Unit Wt.: _____ pcf (If Fine Sized - FM _____)

2.2 Aggregate (Nos. 3, 4, n) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ cu. ft.

Dry Rodded Unit Wt.: _____ pcf

3.0 Water: _____ gal. _____ pcy _____ cu. ft.

WPCD G1 BP07 Generator Replacement

EXAMPLE FORM A (CONTINUED)

4.0 Admixtures expressed as fluid ounces/cubic yard, and estimated range

Source: _____ Name: _____ Type _____ oz

Source: _____ Name: _____ Type _____ oz

Source: _____ Name: _____ Type _____ oz

Total Admixture Liquid Vol. _____ cu. ft.

(*) Note: Show volume in 4.0 if not included in cubic feet of air or water.

5.0 Other Materials - fibers, color pigment or other additions

Sp. Gr. _____ pcy _____ cu. ft.

—

Total Mixture Mass and Volume: _____ pcy _____ cu. ft.

Fresh Concrete Properties

Coarse & Fine Aggregate Gradation

Percent Passing

Slump _____ +/- _____ in.

Sieve Size

Aggregate No.

Unit Weight _____ pcf

2 in.

1 2 3 4 Combined

Air Content _____ +/- _____ %

1-1/2 in.

1 in.

3/4 in.

1/2 in.

If Trail Batch Data -

3/8 in.

Identify Batch No. _____

No. 4

Batch Date _____

No. 8

Concrete Temp. _____ °F

No. 16

Comp. Strength-Average _____ °F

No. 30

WPCD G1 BP07 Generator Replacement

EXAMPLE FORM A (CONTINUED)

7 day avg. _____psi	No. 50	_____	_____	_____	_____	_____
28 day avg. _____psi	No. 100	_____	_____	_____	_____	_____
	No. 200	_____	_____	_____	_____	_____

Comments: _____

Signature: _____ Date: _____

Title: _____

Organization: _____

WPCD G1 BP07 Generator Replacement

EXAMPLE FORM B

CONCRETE SUPPLIER: _____

MATERIAL TRAIL BATCH NUMBER - proportions per cubic yard

1 2 3 4

1.0 Cement Source: _____

 Type _____ lb lb lb lb

1.1 Other Cementitious Material

Sources: _____

 Type _____ lb lb lb lb

2.0 Aggregate No. 1 Size _____ Source: _____

 SSD _____ lb lb lb lb

 Alternate No. 1 Lightweight Aggregates Type _____ Source: _____

 Sp. Gr. Factor _____

 Oven Dry lb lb lb lb

 Wet lb lb lb lb

2.1 Aggregate No. 2 Size _____ Source: _____

 SSD _____ lb lb lb lb

2.2 Aggregate Nos. 3, 4, n) Size _____ Source: _____

 SSD _____ lb lb lb lb

3.0 Water lb lb lb lb

4.0 Admixtures Source: _____

 _____ Type _____ oz oz oz oz

 _____ Type _____ oz oz oz oz

 _____ Type _____ oz oz oz oz

WPCD G1 BP07 Generator Replacement

EXAMPLE FORM B (CONTINUED)

5.0 Other Materials

_____ Type _____ lb _____ lb _____ lb _____ lb

Total Mass: _____ lb _____ lb _____ lb _____ lb

Total Mass/cy: _____ pcy _____ pcy _____ pcy _____ pcy

Relative Cubic Yard Volume: _____ cy _____ cy _____ cy _____ cy

Water-Cementitious Material Ratio:

Fresh Concrete Properties

TRAIL BATCH NUMBER

	<u>## -1</u>	<u>## -2</u>	<u>## -3</u>	<u>## -4</u>
Slump-inches	_____	_____	_____	_____
Air-Content %	_____	_____	_____	_____
Unit Wt. pcf	_____	_____	_____	_____
Concrete Temp. °F	_____	_____	_____	_____
Compressive Strength Results (ASTM C192, C39) or Other Specified Test Requirements				
7 days	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
Average (7 day)	_____	_____	_____	_____

WPCD G1 BP07 Generator Replacement

EXAMPLE FORM B (CONTINUED)

28 days	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
Average (28 day)	_____	_____	_____	_____
Water-Cementitious Material Ratio:	_____	_____	_____	_____

Signature: _____ Date: _____

Title: _____

Organization: _____

END OF SECTION 030000

SECTION 260500 - GENERAL PROVISIONS ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Provide complete electrical work as shown on the drawings and as specified. Refer to drawings and Division 1 for further information.
- B. Electrical work includes, but is not limited to, the following:
 - 1. Feeders 600 volts and below
 - 2. Branch circuits
 - 3. Grounding system
 - 4. Cabinets, boxes, and fittings
 - 5. Raceways
 - 6. Labeling and Schedules
 - 7. Transformers
 - 8. Switchboards
 - 9. Engine Generator
 - 10. Transfer Switches
 - 11. Panelboards
 - 12. Wiring devices
 - 13. Enclosed switches

WPCD G1 BP07 Generator Replacement

14. Lighting system, including lighting fixtures and controls
15. Branch circuit terminations for mechanical units, HVAC units, and building utility equipment
16. Control panels and associated devices

1.3 SUBMITTALS

- A. Detailed shop drawings of equipment to be furnished under this contract will be submitted to the Owner's Representative for review prior to manufacturing or delivering to the job site.
- B. Contractor's failure to submit proper shop drawings and obtain approval of the equipment, material, or devices prior to manufacturing and delivery to the job site will not be a reason to initiate a change order or allow for additional compensation to the Contractor, when changes are necessary to comply with requirements of the specifications or drawings.
- C. Refer to Division 1 for further requirements regarding submittals.
- D. Shop drawings will be submitted for the following equipment:
 1. Conductors 600 volts and below
 2. Raceways
 3. Lighting control devices
 4. Wiring devices
 5. Safety switches
 6. Lighting fixtures
 7. Switchboards
 8. Engine Generator

WPCD G1 BP07 Generator Replacement

1.4 CONNECTION TO OTHER EQUIPMENT

- A. Complete manufacturers' detailed shop drawings, and wiring and connection diagrams, of equipment requiring electrical connection will be provided as specified elsewhere. Contractor will obtain drawings at time they are needed.
- B. Work that must be altered because of Contractor's failure to obtain shop drawings will be corrected by the Contractor without additions to contract price.

1.5 COORDINATION DRAWINGS

- A. Drawings are diagrammatic and show the general location of equipment. The exact location of conduit and equipment will be determined when equipment and mechanical drawings are available. Contractor will use these drawings to coordinate installation of electrical equipment.
- B. Contractor will be permitted to make changes to meet field conditions or material delivery conditions which may arise. However, in each instance, the proposed change must be submitted in the form of drawings or sketches for approval and acceptance by the Owner's Representative.

1.6 RECORD DRAWINGS

- A. Contractor will keep in the field, and open to inspection by the Owner's Representative, an accurate, current, progressive record of actual installation of electrical system. On completion of work, Contractor will deliver to the Owner's Representative marked prints showing actual routing of conduit and ducts, location and elevation of devices, circuit numbers of lighting and power circuits, etc.
- B. Refer to Division 1 for further requirements regarding record drawings.

1.7 CODES, PERMITS, INSPECTIONS

- A. Work will comply with latest requirements of the National Electrical Code, National Electrical Safety Code, state building rules and regulations, local ordinances, and such other statutory provisions that pertain to this class of work. Such code, rules, regulations, and local ordinances will be considered part of these contract documents.
- B. Contractor will, at their own expense, obtain necessary permits for construction and performance of work herein specified.

WPCD G1 BP07 Generator Replacement

- C. Contractor will, at their own expense, secure a certificate of final inspection and approval from inspection authority having jurisdiction prior to final approval.

1.8 SUBSTITUTIONS

- A. Contractor's proposal will be based only on materials and equipment specified. It is not intended, however, to necessarily limit bidding to specified items. Therefore, bidders are invited and encouraged to list, on substitution sheet, items which they wish to have considered for substitution. The Owner reserves the right to reject any or all substitutions, and Contractor hereunder will be responsible to provide materials and equipment as specified.

1.9 SHUTDOWNS

- A. Contractor will provide a minimum of 5 working days notice to the Owner's Representative and Owner of anticipated shutdown requirements of any operating system.
- B. Tie-ins to existing utilities must be performed in accordance with a schedule approved by the Owner.

1.10 MANUFACTURER'S GUARANTEE

- A. If at any time within 18 months after date of receiving equipment, devices, and material on site or 12 months after installation, defects in materials, design, construction, workmanship, or failure to meet specifications or performance becomes evident, manufacturer will repair or replace defective parts at no cost to the Owner. Work under warranty will be performed so that it does not affect Owner's normal operation, and will be coordinated with Owner for timing and shutdown schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 260050

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire.

WPCD G1 BP07 Generator Replacement

2. Belden Inc.
 3. Encore Wire Corporation.
 4. General Cable Technologies Corporation.
 5. Southwire Incorporated.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Wire And Cable
1. General Requirements. Furnish wire and cable per standard specifications established for such material and construction by ASTM, ANSI, ICEA and NEMA, where applicable. Furnish copper conductors unless otherwise specified, not less than No. 12 AWG, except control conductors which may be No. 14 AWG. Furnish conductor sizes as indicated. Furnish stranded conductors for sizes No. 10 AWG and larger.
 2. Wire for Final Connection in Conduit: to HID Fixtures with Remote Ballasts, and Remote Ballasts. No. 12 AWG Stranded copper, NEC Type SF-2 rated 200 deg C, 600 volts. 3.
 3. Wire for Use in Fluorescent Fixture Wiring Channels: Stranded copper, NEC Type THHN, or THWN, rated 90 deg C, 600 volts.
 4. Wire for Exposed Cord Connection to Fluorescent Fixtures: Three conductor stranded copper, NEC Type SO rated 60 deg C, 600 volts.
 5. Wire for Exposed Cord Connection; to Integrally Ballasted HID Fixtures. Three conductor portable cord Type SO consisting of 3 stranded annealed copper conductors individually insulated with not less than 30 mils of heat and moisture resistant ethylene propylene rubber compound rated 90 deg C, 600 volts, cabled round with fillers and binder tape covered with an overall neoprene jacket not less than 60 mils thick, UL listed.
 6. Wire for General Interior and Exterior Use: Single conductor, annealed copper, NEC Type XHHW or THHN/THWN rated 90 deg C in dry locations and 75 deg C in wet locations, 600 volts, or NEC Type RHW rated 75 deg C, 600 volts.
 7. Wire for Underground Service Entrance: Single conductor, annealed copper, NEC Type XHHW rated 75 deg C, 600 volts.
 8. Wire for Underground Duct or Conduit: Single conductor, as indicated on the Drawings, NEC Type XHHW rated 75 degC, 600 volts.
 9. Wire for Use in High Temperature Areas; as Indicated [U]: Single conductor annealed copper, NEC Type FEP or PFA rated 200 degC, 600 volts.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Gardner Bender.
 - 3. Hubbell Power Systems, Inc.
 - 4. Ideal Industries, Inc.
 - 5. Ilsco; a branch of Bardes Corporation.
 - 6. NSi Industries LLC.
 - 7. O-Z/Gedney; a brand of the EGS Electrical Group.
 - 8. 3M; Electrical Markets Division.
 - 9. Tyco Electronics.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- 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 NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls (vertically only), ceilings, and floors unless otherwise indicated.

WPCD G1 BP07 Generator Replacement

- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. 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.
- D. Use pulling means including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.2 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.3 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.4 SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. All penetrations through walls floor or ceilings will be sealed with an approved compound for the use.

3.5 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 078413 "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
 - a. Emergency circuits.
 - b. Motor circuits.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Ground rings.
 - 3. Grounding arrangements and connections for separately derived systems.
 - 4. Grounding sensitive electronic equipment.
- B. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 "Operation and Maintenance Data," include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at test wells based on NETA MTS and NFPA 70B.

WPCD G1 BP07 Generator Replacement

- a. Tests will determine if ground-resistance or impedance values remain within specified maximums, and instructions will recommend corrective action if values do not.
- b. Include recommended testing intervals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. 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.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

WPCD G1 BP07 Generator Replacement

- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting will comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4-inch diameter by 10 feet long.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install a solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
 - 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

WPCD G1 BP07 Generator Replacement

- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

WPCD G1 BP07 Generator Replacement

- D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

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. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. 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 bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

WPCD G1 BP07 Generator Replacement

- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 100 feet apart. Exothermic weld the rod to the foundation rebar and steel structure.
- G. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod, extending around the perimeter of the building.
 - 1. Install tinned-copper conductor not less than No. 4/0 AWG for ground ring and for taps to building steel.
 - 2. Bury ground ring not less than 24 inches from building's foundation.

3.4 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs. The label or its text will be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing grounding system, but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than

WPCD G1 BP07 Generator Replacement

natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

- b. Perform tests by fall-of-potential method according to IEEE 81.
- 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. 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 at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity between 501 kVA-1000kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohms.
 - 5. Substations and Pad-Mounted Equipment: 5 ohms.
 - 6. Manhole Grounds: 10 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - 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 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.

WPCD G1 BP07 Generator Replacement

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 "Roof Accessories."

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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. WesBanco, Inc.

WPCD G1 BP07 Generator Replacement

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types 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 will have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body will be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-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 where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 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:

WPCD G1 BP07 Generator Replacement

- 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
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. Materials: Comply with requirements in Division 5 "Metal Fabrications" for steel shapes and plates.

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 EMT, IMC, and RMC as required by scheduled in NECA 1, where its Table 1 lists maximum spacing less than stated in NFPA 70. Minimum rod size will be 1/4 inch in diameter.

WPCD G1 BP07 Generator Replacement

- 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.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 regarding installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Mounting and Anchorage 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 New Concrete: Bolt to concrete inserts.
 - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 3. 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.
 - 4. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
- 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. Comply with installation requirements in Division 5 "Metal Fabrications" for site-fabricated metal supports.

WPCD G1 BP07 Generator Replacement

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

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 3 "Cast-in-Place Concrete".
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.5 PAINTING

- A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Boxes, enclosures, and cabinets.
4. Handholes and boxes for exterior underground cabling.

1.2 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.
- C. EMT: Electrical metal tubing

1.3 ACTION SUBMITTALS

- A. Product Data: For raceways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Qualification Data: For professional engineer.
- D. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

WPCD G1 BP07 Generator Replacement

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

E. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. O-Z/Gedney; a brand of EGS Electrical Group.
6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings will be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

WPCD G1 BP07 Generator Replacement

- C. IMC: Comply with ANSI C80.6 and UL 1242.
- D. EMT: Comply with ANSI C80.3 and UL 797.
- E. FMC: Comply with UL 1; aluminum.
- F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel or die cast.
 - b. Type: Setscrew or compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.
 - 6. Condux International, Inc.
 - 7. Electri-Flex Company.

WPCD G1 BP07 Generator Replacement

8. Kraloy.
 9. Lamson & Sessions; Carlon Electrical Products.
 10. Niedax-Kleinhuis USA, Inc.
 11. RACO; a Hubbell company.
 12. Thomas & Betts Corporation.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings will be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. LFNC: Comply with UL 1660.
- E. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: Comply with UL 514B.
- G. Solvent cements and adhesive primers will have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturers
1. Cooper Technologies Company; Cooper Crouse-Hinds.
 2. Hoffman; a Pentair company.
 3. Hubbell Incorporated; Killark Division.
 4. Thomas & Betts Corporation.
 5. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations will be listed for use in wet locations.

WPCD G1 BP07 Generator Replacement

- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Metal Floor Boxes:
 - 1. Material: Cast metal.
 - 2. Type: Fully adjustable.
 - 3. Shape: Rectangular.
 - 4. Listing and Labeling: Metal floor boxes will be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb will be listed and marked for the maximum allowable weight.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- H. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- I. Gangable boxes are allowed.
- J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type as noted on drawings, with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- K. Cabinets:
 - 1. NEMA 250, Type as noted on drawings, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.

WPCD G1 BP07 Generator Replacement

3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets will be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: RNC, Type EPC-40-PVC.
2. Concealed Conduit, Aboveground: EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: GRC to 15'-0" AFF transition to EMT above 15'-0".
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment: FMC, except use LFMC in damp or wet locations.
4. Damp or Wet Locations: GRC.
5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

WPCD G1 BP07 Generator Replacement

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install surface raceways as concealed as possible in a neat and trade acceptable manor.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter.
- 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 raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. Stub-ups to Above Recessed Ceilings:
1. Use EMT, IMC, or RMC for raceways.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

WPCD G1 BP07 Generator Replacement

- J. 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.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- Q. 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. Cap underground raceways designated as spare above grade alongside raceways in use.
- R. Install raceway sealing fittings at accessible locations according to NFPA 70 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 according to NFPA 70.
- S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.

WPCD G1 BP07 Generator Replacement

- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
 - U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.
 - V. 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. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
 - W. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
 - X. Locate boxes so that cover or plate will not span different building finishes.
 - Y. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
 - Z. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
 - AA. Vertically install conduit in concealed walls. Do not run any raceways inside walls horizontally through the wall. All concealed conduit will be non-flexible type solid walled tubing type.
- 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.
- 3.4 FIRESTOPPING
- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Equipment identification labels.
6. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout 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.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE.
 - 3. Inscriptions for Orange-Colored Tapes: COMMUNICATIONS CABLE.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label shall include, but are not limited to, the following legends:

WPCD G1 BP07 Generator Replacement

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES"

2.6 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

2.7 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F, according to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to over 185 deg F.
 4. Color: Black except where used for color-coding.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 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.

WPCD G1 BP07 Generator Replacement

- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- I. 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 exceeds 16 inches overall.
- J. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.

WPCD G1 BP07 Generator Replacement

- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and hand holes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities have jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. 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.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and hand holes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive vinyl labels with the conductor designation.
- F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

WPCD G1 BP07 Generator Replacement

- G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install flush-mounted panelboards and similar equipment in finished spaces.
- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For 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.
- I. Operating Instruction Signs: 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.
- J. Emergency Operating Instruction Signs: 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.
- K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the 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: Self-adhesive, 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 two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label 4 inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

WPCD G1 BP07 Generator Replacement

- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g. Emergency system boxes and enclosures.
- h. Motor-control centers.
- i. Enclosed switches.
- j. Enclosed circuit breakers.
- k. Enclosed controllers.
- l. Variable-speed controllers.
- m. Power transfer equipment.
- n. Contactors.
- o. Remote-controlled switches, dimmer modules, and control devices.
- p. Power-generating units.
- q. Monitoring and control equipment.
- r. Busway and bus plugs
- s. UPS equipment.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Indoor occupancy sensors.

B. Related Requirements:

1. Section 262726 "Wiring Devices"
2. Section 265100 "Interior Lighting"

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY SENSORS

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
1. Wattstopper
 2. Hubbell Building Automation, Inc.
 3. Leviton Mfg. Company Inc.
 4. Lutron Electronics Co., Inc.
 5. Crestron
 6. Sensor Switch
- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
 4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

WPCD G1 BP07 Generator Replacement

7. Bypass Switch: Override the "on" function in case of sensor failure.

C. Digital Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on the unit. Include the following features:

1. RJ-45 port(s) for connection to digital room controller.
2. Sensitivity Adjustment: Separate for each sensing technology.
3. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm) and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
4. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

D. Digital Control and Networkability: Self-configuring, plenum rated, digitally addressable three relay controllers for control of 120/ 277-volt ballasts by digital occupancy sensor or digital lighting network management. Include the following features:

1. RJ-45 port(s) for connection to local network.
2. RJ-45 port(s) for connection to digital occupancy sensor(s).

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.
2. Hubbell Building Automation, Inc.
3. Leviton Mfg. Company Inc.
4. Lutron Electronics Co., Inc.
5. Watt Stopper.
6. Sensor Switch

WPCD G1 BP07 Generator Replacement

- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
 - 3. Switch Rating: Not less than 1200-VA fluorescent at 277 V.
- C. Digital Wall Switch Sensor Tag WS1:
 - 1. RJ-45 port(s) for connection to digital room controller
 - 2. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft.
 - 3. Sensing Technology: Dual technology - PIR and ultrasonic.
 - 4. Switch Type: SP, manual "on," automatic "off."
 - 5. Voltage: Match the circuit voltage.
 - 6. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 16 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

WPCD G1 BP07 Generator Replacement

- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 260923

SECTION 262200 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 150 kVA:
 - 1. Distribution transformers.

1.2 ACTION SUBMITTALS

- A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer Seismic Qualification Certification: Submit certification that transformers, accessories, and components will withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

WPCD G1 BP07 Generator Replacement

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Qualification Data: For testing agency.

C. Source quality-control test reports.

D. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
- B. Source Limitations: Obtain each transformer type through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Power Systems
 - 2. ABB
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Cores: Grain-oriented, non-aging silicon steel.
- C. Coils: Continuous windings without splices except for taps.
 - 1. Internal Coil Connections: Brazed or pressure type.
 - 2. Coil Material: Copper.

2.3 DISTRIBUTION TRANSFORMERS

- A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

WPCD G1 BP07 Generator Replacement

- B. Cores: One leg per phase.
- C. Enclosure: Ventilated, NEMA 250, Type 2.
 - 1. Core and coil will be encapsulated within resin compound, sealing out moisture and air.
- D. Transformer Enclosure Finish: Comply with NEMA 250.
 - 1. Finish Color: Gray ANSI 61 gray.
- E. Taps: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- F. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.
- G. Energy Efficiency for Transformers Rated 15 kVA and Larger:
 - 1. Complying with NEMA TP 1, Class 1 efficiency levels.
 - 2. Tested according to NEMA TP 2.
- H. Wall Brackets: Manufacturer's standard brackets.
- I. Fungus Proofing: Permanent fungicidal treatment for coil and core.
- J. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

2.4 IDENTIFICATION DEVICES

- A. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.91.

WPCD G1 BP07 Generator Replacement

- B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project. Energized transformers with excessive humming or vibration producing sound levels equal to or above 70 dB will be replaced.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B. Verify that field measurements are taken as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance will be 5 ohms at location of transformer.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - 1. Brace wall-mounting transformers as specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions, seismic codes applicable to Project, and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

3.3 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

WPCD G1 BP07 Generator Replacement

- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:

- 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

- B. Remove and replace units that do not pass tests or inspections and retest as specified above.

- C. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

- B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 262200

SECTION 262300 - LOW-VOLTAGE SWITCHGEAR

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes metal-enclosed, low-voltage power fused switch switchgear and components rated 600 V and less for use in ac systems.

1.2 DEFINITIONS

- A. ATS: Acceptance Testing Service.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of switchgear, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each type of switchgear and related equipment.
 - 1. Details including required clearances and mounting space needed in equipment. Include the following:
 - a. UL listing for series rating of installed devices.
 - b. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around switchgear where pipe and ducts are prohibited. Show switchgear layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- B. Qualification Data: For testing agency.

WPCD G1 BP07 Generator Replacement

- C. Field quality-control test reports.
- D. Updated mimic-bus diagram reflecting field changes after final switchgear load connections have been made, for record.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For switchgear and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Six of each type and rating used. Include spares for potential transformer fuses, control power fuses, and fuses and fusible devices for fused circuit breakers.
 - 2. Indicating Lights: Six of each type installed.
 - 3. Touchup Paint: 1 container of paint matching enclosure finish, each 0.5 pint.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Source Limitations: Obtain switchgear through one source from a single manufacturer.

WPCD G1 BP07 Generator Replacement

- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of switchgear. Any system chosen must fit in the location indicated.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store switchgear components indoors in clean dry space with uniform temperature to prevent condensation. Protect switchgear from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subjected to weather, cover gear to provide protection from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside switchgear; install electric heating (250 W per section) to prevent condensation.

1.9 COORDINATION

- A. Coordinate layout and installation of conduit and components with other construction that penetrates ceilings or is supported by them, including conduit, piping, equipment, and adjacent surfaces. Maintain required clearances for workspace and equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Power Systems
 - 2. ABB
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; Schneider Electric.

2.2 RATINGS

- A. Nominal System Voltage: 480Y/277 V, 4-wire, 60 Hz.
- B. Main Service Fused Switch: 3000A.
- C. Short-Time and Short-Circuit Current: 35,000A rms.

2.3 COMPONENTS

- A. Instrument Transformers: Comply with IEEE C57.13.
 - 1. Potential Transformers: Secondary-voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.
 - 2. Current Transformers: Ratios as indicated; burden and accuracy class suitable for connected relays, meters, and instruments.
- B. Multifunction Digital-Metering Monitor: UL-listed or -recognized, microprocessor-based unit suitable for three- or four-wire systems and with the following features:
 - 1. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
 - 2. Switch-selectable digital display of the following:
 - a. Phase Currents, Each Phase: Plus or minus 1 percent.
 - b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - d. Three-Phase Real Power: Plus or minus 2 percent.
 - e. Three-Phase Reactive Power: Plus or minus 2 percent.
 - f. Power Factor: Plus or minus 2 percent.
 - g. Frequency: Plus or minus 0.5 percent.
 - h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
 - i. Accumulated energy, in megawatt hours (joules), plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
 - 3. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.

WPCD G1 BP07 Generator Replacement

- C. Relays: Comply with IEEE C37.90, long-time/short-time/instantaneous/ground type (LSIG) with settings as determined in coordination study; provide with test blocks and plugs.
- D. Surge Arresters: Distribution class, metal-oxide-varistor type. Comply with IEEE C62.11 and NEMA LA 1.
 - 1. Install in cable termination compartments and connect in each phase of circuit.
 - 2. Coordinate rating with circuit voltage.
- E. Fungus Proofing: Permanent fungicidal treatment for switchgear interior, including instruments and instrument transformers.
- F. Control Power Supply: Control power transformer supplying 120-V control circuits through secondary disconnect devices. Include the following features:
 - 1. Dry-type transformers, in separate compartments for units larger than 3 kVA, including primary and secondary fuses.
 - 2. Two control power transformers in separate compartments with necessary interlocking relays; each transformer connected to line side of associated main circuit breaker.
 - a. Secondary windings connected through a relay or relays to control bus to effect an automatic transfer scheme.
 - b. Secondary windings connected through an internal automatic transfer switch to switchgear control power bus.
 - 3. Control Power Fuses: Primary and secondary fuses with current-limiting and overload protection.
- G. Control Wiring: Factory installed, complete with bundling, lacing, and protection; and complying with the following:
 - 1. Flexible conductors for No. 8 AWG and smaller, for conductors across hinges and for conductors for interconnections between shipping units.
 - 2. Conductors sized according to NFPA 70 for duty required.

2.4 Fused Switch

- A. Description: Comply with IEEE C37.
- B. Ratings: As indicated for continuous, interrupting, and short-time current ratings for each fuse; voltage and frequency ratings same as switchgear.
- C. Drawout Features: fused switch mounting assembly equipped with a racking mechanism to position switch and hold it rigidly in connected, test, and disconnected positions. Include the following features:
 - 1. Interlocks: Prevent movement of switch to or from connected position when it is closed and prevent closure of switch unless it is in connected, test, or disconnected position.
 - 2. Switch Positioning: An open switch may be racked to or from connected, test, and disconnected positions only with the associated compartment door closed unless live parts are covered by a full dead-front shield. An open switch may be manually withdrawn to a position for removal from the structure with the door open. Status for connection devices for different positions includes the following:
 - a. Test Position: Primary disconnect devices disengaged, and secondary disconnect devices and ground contact engaged.
 - b. Disconnected Position: Primary and secondary devices and ground contact disengaged.
- D. Padlocking Provisions: For installing at least three padlocks on each fused switch to secure its enclosure and prevent movement of drawout mechanism.
- E. Operating Handle: One for each fused switch capable of manual operation.

2.5 ACCESSORIES

- A. Accessory Set: Furnish tools and miscellaneous items required for switch and switchgear test, inspection, maintenance, and operation.
 - 1. Racking handle to manually move switch between connected and disconnected positions.
 - 2. Portable test set for testing switch without removal from switchgear.
 - 3. Relay and meter test plugs suitable for testing switchgear meters and switchgear class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces where switch will be installed for compliance with installation tolerances, required clearances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 260553 "Identification for Electrical Systems."

3.3 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test continuity of each circuit.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
 - 1. Test and adjust components and equipment.
 - 2. Verify that electrical control wiring installation complies with manufacturer's submittal by means of point-to-point continuity testing. Verify that wiring installation complies with requirements in electrical Sections.
 - 3. Complete installation and startup checks according to manufacturer's written instructions.

WPCD G1 BP07 Generator Replacement

4. Assist in field testing of equipment including pretesting and adjusting of equipment and components.
5. Report results in writing.

C. Perform the following field tests and inspections and prepare test reports:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for each of the following NETA categories:
 - a. Switch.
 - b. Protective relays.
 - c. Instrument transformers.
 - d. Metering and instrumentation.
 - e. Surge arresters.
2. Remove and replace malfunctioning units and retest as specified above.

3.5 CLEANING

- A. On completion of installation, inspect interior and exterior of switchgear. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

3.6 PROTECTION

- A. Temporary Heating: Apply temporary heat to switchgear, according to manufacturer's written instructions, throughout periods when switchgear environment is not controlled for temperature and humidity within manufacturer's stipulated service conditions.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain switch.

END OF SECTION 262300

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service and distribution switchboards rated 600 V and less.
2. Disconnecting and overcurrent protective devices.
3. Instrumentation.
4. Control power.
5. Accessory components and features.
6. Identification.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards.
3. Include schematic and wiring diagrams for power, signal, and control wiring.

C. Field quality-control reports.

D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- 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 2.
- C. Comply with NFPA 70.
- D. Comply with UL 891.

WPCD G1 BP07 Generator Replacement

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Power Systems
 - 2. ABB
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; Schneider Electric.
- B. Front-Connected, Front-Accessible Switchboards:
 - 1. Main Devices: Panel mounted.
 - 2. Branch Devices: Panel mounted.
 - 3. Sections front and rear aligned.
- C. Nominal System Voltage: 480Y/277 V.
- D. Main-Bus Continuous: As indicated on the drawings. Cross section of bussing will be fully rated. Tapered busses will not be accepted.
- E. Enclosure: Steel, NEMA 250, Type 1.
 - 1. Enclosure Finish: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.
 - 2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
- F. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- G. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.
- H. Phase and Neutral Buses and Connections: Three phase, four wire unless otherwise indicated. Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.

WPCD G1 BP07 Generator Replacement

1. Ground Bus: 1/4-by-2-inch- minimum size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors.
 2. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
 3. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables.
- I. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. 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 with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor material.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
- B. Insulated-Case Circuit Breaker (ICCB): 100 percent rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.
1. Fixed circuit-breaker mounting.

WPCD G1 BP07 Generator Replacement

2. Two-step, stored-energy closing.
3. Standard-function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time time adjustments.
 - c. Ground-fault pickup level, time delay, and I²t response.
- C. High-Pressure, Butt-Type Contact Switch: Operating mechanism uses butt-type contacts and a spring-charged mechanism to produce and maintain high-pressure contact when switch is closed.
 1. Main-Contact Interrupting Capability: Minimum of 12 times the switch current rating.
 2. Operating Mechanism: Manual handle operation to close switch; stores energy in mechanism for opening and closing.
 - a. Electrical Trip: Operation of lever or push-button trip switch, or trip signal from ground-fault relay or remote-control device, causes switch to open.
 - b. Mechanical Trip: Operation of mechanical lever, push button, or another device causes switch to open.
 3. Ground-Fault Relay: Comply with UL 1053; self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and three-phase current transformer/sensor.
 - a. Configuration: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - b. Internal Memory: Integrates the cumulative value of intermittent arcing ground-fault currents and uses the effect to initiate tripping.
 - c. No-Trip Relay Test: Permits ground-fault simulation test without tripping switch.
 - d. Test Control: Simulates ground fault to test relay and switch (or relay only if "no-trip" mode is selected).
 4. Open-Fuse Trip Device: Arranged to trip switch open if a phase fuse opens.
- D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

2.3 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store and install switchboards and accessories according to NECA 400.
- B. Equipment Mounting: Install switchboards on concrete base, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete".
- C. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
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. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.3 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.

WPCD G1 BP07 Generator Replacement

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

- B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 "Operation and Maintenance Data," include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. 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.
- C. Comply with NEMA PB 1.
- D. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation as necessary.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.
 - b. Altitude: Not exceeding 6600 feet.

1.9 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
6. Finishes:
 - a. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
7. Directory Card: Inside the panelboard door, mounted in transparent card holder.

B. Incoming Mains Location: Top and bottom.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads. Provide 200% neutral as indicated on panel schedules.

WPCD G1 BP07 Generator Replacement

- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Compression type.
 - 3. Ground Lugs and Bus-Configured Terminators: Compression type.
 - 4. Extra-Capacity Neutral Lugs (where indicated): Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. ABB
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, power and feeder 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.
- D. Mains: Circuit breaker.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Power Systems
 - 2. ABB
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Install overcurrent protective devices and controllers not already factory installed.
- F. Install filler plates in unused spaces.
- G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- I. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installation. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- 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 distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test 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.

C. Panelboards will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

WPCD G1 BP07 Generator Replacement

3.6 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Wall-switch occupancy sensors.
5. Communications outlets.
6. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.2 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. TVSS: Transient voltage surge suppressor.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

WPCD G1 BP07 Generator Replacement

- B. Shop Drawings: List of legends and description of materials and processes used for pre-marking wall plates.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, 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 NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:

WPCD G1 BP07 Generator Replacement

- a. Cooper; 5351 (single), CR5362 (duplex).
- b. Hubbell; HBL5351 (single), HBL5352 (duplex).
- c. Leviton; 5891 (single), 5352 (duplex).
- d. Pass & Seymour; 5361 (single), 5362 (duplex).

2.4 GFCI RECEPTACLES

A. General Description:

- 1. Straight blade, non-feed-through type.
- 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
- 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7590.

C. GFCI, Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; TWRVGF15.
 - b. Hubbell; GFTR15.
 - c. Pass & Seymour; 1594TRWR.
- 2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

2.5 HAZARDOUS (CLASSIFIED) LOCATION RECEPTACLES

- A. Available Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cooper Crouse-Hinds.
 - b. EGS/Appleton Electric.
 - c. Killark; Division of Hubbell Inc.

2.6 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) Pass & Seymour; CSB20AC1
 - b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) Pass & Seymour; CSB20AC2.
 - c. Three Way:
 - 1) Cooper; AH1223.
 - 2) Hubbell; HBL1223.
 - 3) Leviton; 1223-2.
 - 4) Pass & Seymour; CSB20AC3.

2.7 WALL PLATES

- A. Single and combination types will match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
 - 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
 - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, thermoplastic with lockable cover.

2.8 FLOOR BOXES

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hubbell Incorporated; Wiring Device-Kellems.
 - 2. Pass & Seymour/Legrand.
 - 3. Thomas & Betts Corporation.
 - 4. Wiremold/Legrand.Service.
 - 5. LSR, Inc.
- B. Type: Modular, flush-type, dual-service units with receptacle configuration as noted on drawings.
- C. Compartments: Barrier separates power from voice and data communication cabling.
- D. 11-gauge finished steel cover with mitered brass carpet edging and stainless-steel compression latches.
- E. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

- F. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.9 POKE-THROUGH ASSEMBLIES

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Pass & Seymour/Legrand.
3. LSR, Inc.
4. Thomas & Betts Corporation.
5. Wiremold/Legrand.

- B. Description:

1. Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
2. Comply with UL 514 scrub water exclusion requirements.
3. Size: Selected to fit nominal 3-inch (75-mm) cored holes in floor and matched to floor thickness.
4. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
5. Closure Plug: Arranged to close unused 3-inch (75-mm) cored openings and reestablish fire rating of floor.
6. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of two, four-pair cables that comply with requirements in Section 271500 "Communications Horizontal Cabling."

2.10 FINISHES

- A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

WPCD G1 BP07 Generator Replacement

2. Wiring Devices Connected to Emergency Power System: Red.

- B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
 5. Coordinate the NEMA configuration of Receptacles for specific equipment with the associated equipment.
- C. Conductors:
 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices will meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail or replace all damaged conductors.

WPCD G1 BP07 Generator Replacement

- b. Straighten conductors that remain and remove corrosion and foreign matter.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

WPCD G1 BP07 Generator Replacement

- H. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.
- B. All 120V, 15A and 20A receptacles in the kitchen area will have ground-fault circuit-interrupter protection.

3.3 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.

WPCD G1 BP07 Generator Replacement

6. Tests will be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fuses rated 600 V and below and accessory items. Types of products in this Section include the following:
 - 1. Plug Fuses.
 - 2. Cartridge Fuses.
 - 3. Spare Fuse Cabinet.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data for fuses. Include descriptive data and time-current curves for all fuses and let-through current curves for those with current limiting characteristics.
- C. Coordination Study: Where fuses of a manufacturer other than the one designated in the Schedule of Fusible Devices are selected, submit a full coordination study showing graphically that the substitute fuses coordinate selectively with both upstream and downstream components. Prepare the study under the supervision of a registered professional engineer in accordance with ANSI/IEEE Standard 242-1986 "Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems." Include single line diagram, coordinated time/current characteristics, fuse performance curves, and fault current calculations adequate to demonstrate satisfactory component protection and selective coordination of protective devices.

- D. Coordination study showing graphically how fuses coordinate selectively with both upstream and downstream components. Perform study under the supervision of a registered professional engineer in accordance with ANSI/IEEE Standard 242-1986 "Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems." Include single line diagram, coordinated time/current characteristics, fuse performance curves, and fault current calculations adequate to demonstrate satisfactory component protection and selective coordination of protective devices.
- E. Shop drawing of spare fuse cabinet showing dimensions and features, including storage provision for fuse cartons.

1.4 QUALITY ASSURANCE

- A. Electrical Component Standard: Components and installation will comply with NFPA 70 "National Electrical Code."
- B. UL Listing and Labeling: Items provided under this Section will be listed and labeled by UL.
- C. Nationally Recognized Testing Laboratory (NRTL) Listing and Labeling: Items provided under this Section will be NRTL listed and labeled. The term "NRTL" will be as defined in OSHA Regulation 1910.7.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver spare fuses stored in locked spare fuse cabinet after cabinet has been installed.

1.6 EXTRA MATERIALS

- A. Maintenance Stock, Fuses: For types and ratings required, furnish spare fuses, amounting to one unit for every 5 installed units, but not less than one set of 3 of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Bussmann Div., Cooper Industries, Inc.
 - 2. Gould, Inc.
 - 3. Littelfuse, Inc.

2.2 FUSES, GENERAL

- A. General: Provide fuses of types, classes, and current ratings as indicated. Voltage ratings will be consistent with the circuits on which used.
- B. Fuses for Direct Current Circuits: Marked for such use by the manufacturer on the fuse label.

2.3 PLUG FUSES

- A. Standard: Comply with UL 198F "Plug Fuses."
- B. Type: Type S, dual-element, time delay.

2.4 CARTRIDGE FUSES

- A. General: Comply with ANSI/IEEE Standard FU1 "Low Voltage Cartridge Fuses." Provide nonrenewable-cartridge-type fuses except as indicated.
 - 1. Class J Fuses: Comply with UL 198C "High-Interrupting Capacity Fuses, Current-Limiting Type."
 - 2. Class L Fuses, 601 to 6000 Amperes: Comply with UL 198C "High-Interrupting Capacity Fuses, Time Delay or Nontime-Delay, Current-Limiting Type."
 - 3. Class RK1 and RK5 Dual Element Time Delay Fuses, 1/10 to 600 Amperes: Comply with UL 198E "Class R Fuses."

4. Class RK1 Fast-Acting (Nontime-Delay) Fuses, 1 to 600 Amperes: Comply with UL 198E "Class R Fuses."
5. Class J, Nontime-Delay Fuses

2.5 SPARE FUSE CABINET

- A. Cabinet: Wall-mounted, 18-gage minimum steel unit with full-length, recessed piano-hinged door with key coded cam lock and pull.
- B. Size: Provide for orderly storage of all spare fuses for this project plus 15 percent spare capacity, minimum.
- C. Finish: Gray baked enamel.
- D. Cabinet Door: Bear the legend in stenciled 1-1/2-inch-high letters "Spare Fuses."

PART 3 - EXECUTION

3.1 APPLICATION OF FUSES

- A. General: Apply fuses as indicated and as follows:
- B. New General Purpose Fusible Switches: Apply the following class and types:
 1. 30-600 Amperes: Class RK1, time delay.
 2. 601-1200 Amperes, Motor or Transformer Circuit: Class L, time delay.
 3. 601-1200 Amperes, Noninductive Circuit: Class L, fast acting.
- C. Bolted Pressure Switches: Class L, time delay.
- D. Service Protectors: Class L, time delay.
- E. Fusible Switch Panelboards: Class RK1, time delay.
- F. Combination Starters: Class RK1, time delay.
- G. Combination Starters in Motor Control Centers: Class RK1, time delay.

- H. Switches in Switchboards: Apply the following classes and types:
 - 1. 60-600 Amperes: Class RK1, time delay.
 - 2. 601 Amperes and Above: Class L, time delay.
- I. Existing General-Purpose Switches: Apply the following classes and types:
 - 1. 30-600 Amperes: Class RK1, time delay.
 - 2. 601-1200 Amperes: Class L, time delay.

3.2 INSTALLATION

- A. Install fuses in fusible devices as indicated.
- B. Install spare fuse cabinet wall mounted where indicated.
- C. Coordination Study: Where coordination study recommends changes in types, classes, features, or ratings of fuses or fusible devices from those indicated, and those changes are approved, make them with no change to the contract price or time of completion.
- D. Coordination Study: Where coordination study recommends changes in types, classes, features, or ratings of fuses or fusible devices from those indicated, make a written request for instructions. Obtain instructions before ordering fuses recommended to be changed.

END OF SECTION 262813

SECTION 262816 – ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this section:
 - 1. General Provisions Electrical
 - 2. Fuses

1.2 SUMMARY

- A. This Section includes circuit and motor disconnects.

1.3 SUBMITTALS

- A. Product data for each type of product specified. Include catalog cuts showing exact catalog number of each item to be provided and indicating electrical ratings (volts, amps, phase, etc.) and NEMA type of the enclosure.
- B. Maintenance data for circuit and motor disconnects, for inclusion in Operation and Maintenance Manual specified in Division 1 and Division 26 Section "General Provisions Electrical"

1.4 QUALITY ASSURANCE

- A. Electrical Component Standards: Provide components complying with NFPA 70 "National Electrical Code" and which are listed and labeled by UL. Comply with UL Standard 98 and applicable NEMA Standard.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Appleton
 - 2. Challenger
 - 3. Crouse-Hinds Co.
 - 4. ABB
 - 5. General Switch Corp.
 - 6. Square D Company.
 - 7. Westinghouse Electric Corp.

2.2 CIRCUIT AND MOTOR DISCONNECT SWITCHES

- A. General: Provide circuit and motor disconnect switches in types, sizes, duties, features ratings, and enclosures as indicated. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations provide NEMA 3R enclosures with raintight hubs. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads.
 - 1. Switches are to be quick-make, quick-break type with operating handle and mechanism as integral part of the box, not the cover.
 - 2. Switches are to be visible blade type with provision for padlocking with at least three padlocks. Switch door is to be interlocked to prevent unauthorized opening of switch door in "on" position.
- B. Fusible Switches: Heavy Duty switches, with fuses of classes and current ratings indicated. See Section "FUSES" for specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable features suitable only for current limiting type fuses.

WPCD G1 BP07 Generator Replacement

- C. Nonfusible Disconnects: Heavy Duty switches of classes and current ratings as indicated.
- D. Double-Throw Switches: Heavy Duty switches of classes and current ratings as indicated.
- E. Bolted Pressure Switches: bolted pressure switches conforming to and listed under UL Standard 977; single or double-throw arrangement as indicated. For fusible units provide fuses as indicated.
- F. Service Switches: Heavy Duty fusible switches. UL listed for use as service equipment under UL Standard 98 or 869.
- G. Switches for Classified (Hazardous) Locations: heavy duty switches, with UL labels and listings for hazardous location classifications in which installed.

2.3 ACCESSORIES

- A. Electrical Interlocks: Provide number and arrangement of interlock contacts in switches as indicated.
- B. Special Enclosure Material: Provide special enclosure material as follows for switches indicated:
 - 1. Stainless Steel Type 304.
 - 2. Molded fiberglass reinforced plastic.
 - 3. Heavy cast aluminum.
- C. Captive Fuse Pullers: Provide built-in fuse pullers arranged to facilitate fuse removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS

- A. General: Provide circuit and motor disconnect switches as indicated and where required by the above Code. Comply with switch manufacturers' printed installation instructions. Verify that proper size and type fuses are installed in each fusible switch. Provide proper clearances in front of the switches to comply with National Electric Code. Mounting height will be as indicated on drawings but will not be more than 6'-6" to the center line of the operating handle.

3.2 FIELD QUALITY CONTROL

- A. Testing: Subsequent to completion of installation of electrical disconnect switches, energize circuits and demonstrate capability and compliance with requirements. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unloaded. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION 262816

SECTION 262913 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following enclosed controllers rated 600 V and less:

1. Full-voltage manual.
2. Full-voltage magnetic.
3. Multispeed.

1.2 QUALITY ASSURANCE

- 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 NFPA 70.
- C. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems".

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

- A. Show controller pole quantities, voltage, NEMA size and type, accessories, short-circuit current rating (or available short-circuit currents), and enclosure type for each controller on Drawings. See "Full-Voltage Controllers" Article in the Evaluations for selection considerations. Enclosed controllers without integral OCPDs (e.g., fuses, MCPs, or thermal-magnetic circuit breakers) may have very low short-circuit current ratings when used in series with upstream devices. See Editing Instruction No. 2 in the Evaluations.
- B. Not all features, accessories, and options in this article are available for every rating, with every enclosure type, and from every listed manufacturer. Verify availability and unique characteristics with manufacturers. Show on Drawings those features and accessories that apply to each controller.
- C. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
- D. Motor-starting switches do not have integral overload relays. See "Motor-Starting Switches" Article in the Evaluations for additional guidance on their use.
- E. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action;

WPCD G1 BP07 Generator Replacement

marked to show whether unit is off or on.

1. Configuration: Nonreversing.
 2. Surface mounting.
 3. Pilot light.
- F. One- and two-pole, fractional horsepower manual controllers are suitable for use with single-phase ac motors up to 1 hp. See "Fractional Horsepower Manual Controllers" Article in the Evaluations for additional guidance on their use.
- G. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
1. Configuration: Nonreversing.
 2. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; melting alloy type.
 3. Surface mounting.
 4. Pilot light.
- H. One-, two-, and three-pole integral horsepower manual controllers are suitable for use with single- and three-phase ac motors up to 10 hp at 480-V ac. See "Integral Horsepower Manual Controllers" Article in the Evaluations for additional guidance on their use.
- I. Three-pole integral horsepower magnetic controllers are suitable for use with three-phase ac motors up to 1600 hp, and from NEMA ICS 2, Size 00 to Size 9; however, not all listed manufacturers offer enclosed controllers up to Size 9. Two- and four-pole models are also available in varying minimum and maximum horsepower ratings and NEMA sizes. See "Magnetic Controllers" Article in the Evaluations for additional guidance on their use.
- J. Magnetic Controllers: Full voltage, across the line, electrically held.
- K. Individual three phase motor starters will be in NEMA 12 general purpose enclosures. All three phase motor starters will be equipped with "Hand-Off-Auto" selector switches mounted on the starter cover unless otherwise noted or required. Starters will be of the combination type, consisting of a full voltage magnetic starter equipped with three internal manual reset thermal overloads, a fused disconnect switch for short circuit protection and disconnecting means, with dead front operation and provisions for locking in the "closed" and "open" position. Each starter will come complete with two normally open and two normally closed interlock contacts in addition to the normally open seal-in contacts. Starters will be provided with a 120 volt holding coil (or as required) and a fused secondary 480/120 volt (or as required) control transformer. Fused disconnect switch units comprising a part of combination starter and contactor assemblies will be three pole, 600 volt rated, quick-make, quick-break, horsepower rated, sized to accommodate a dual element type fuse of 150% of motor full load current.

WPCD G1 BP07 Generator Replacement

2.2 ENCLOSURES

- A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.
 - 2. Wet or Damp Indoor Locations: Type 3R.
 - 3. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
 - 4. Hazardous Locations: Type 4x.

2.3 ACCESSORIES

- A. Push Buttons, Pilot Lights, and Hand Off Auto Selector Switches: NEMA ICS 5; heavy-duty type; factory installed in controller enclosure cover unless otherwise indicated.
- B. Control Relays: Auxiliary and adjustable time-delay relays.
- C. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings. All three phase motor starters provided by this contractor will include under voltage/single phasing protection. Provide in the starter control circuit an under voltage/single phasing protection relay monitoring the 208 volt power of all three phases. When the loss of any phase occurs or when the voltage of any phase drops below a predetermined level of 87%, field adjustable from 80% to 92%, the motor will be automatically taken off line by opening of the starter power contacts. Voltage drop caused by the motor starting current will be transparent to the voltage sensing circuit. Restoration of the motor starter to normal operating conditions will occur automatically when the single phasing or under voltage condition is eliminated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height, and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems".
- B. Install fuses in each fusible-switch enclosed controller.
- C. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses".

WPCD G1 BP07 Generator Replacement

- D. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- E. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems".
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.3 CONTROL WIRING INSTALLATION

- A. Bundle, train, and support wiring in enclosures.
- B. Connect selector switches and other automatic-control selection devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - 2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high- temperature cutouts, and motor overload protectors.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Set field-adjustable switches and overload-relay pickup and trip ranges.

WPCD G1 BP07 Generator Replacement

- B. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cool down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Construction Manager before increasing settings.

END OF SECTION 262913

WPCD G1 BP07 Generator Replacement

SECTION 263213 - EMERGENCY GENERATOR SETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Provide a Diesel-gas-powered emergency generator system, including but not limited to, the following:
 - A. Diesel-gas-driven generator set
 - B. Necessary control devices
- B. Furnish the following items to the contractor for installation:
 - A. Flexible exhaust pipe
 - B. Exhaust silencer
 - C. Flexible fuel lines
 - D. Other applicable items not attached directly to generator set
 - E. Diesel engine
 - F. Radiator with fan
 - G. Exhaust duct flange adapter
 - H. Jacket heaters
 - I. Status/control panel
 - J. Battery Charger

WPCD G1 BP07 Generator Replacement

1.3 RELATED WORK

- A. 900 Gallon Fuel tank with all insulated piping, valves, anti siphon devices, priming pump and control panel.
- B. Day tank with all insulated piping, valves, anti siphon devices.

1.4 STANDARDS

- A. Generator set and associated equipment will meet latest applicable requirements of UL, NFPA 110, OSHA, NEMA MG1, NEC, IEEE, and ANSI.
- B. It is intended that items specified be of industry standard ratings; therefore the kVA ratings and ampere ratings will be manufacturer's next larger size or rating when the specifications cannot be met exactly.

1.5 SUBMITTALS

- A. Submit detailed shop drawings.
- B. Information to be furnished with bid:
 - A. Contractor will furnish two sets of the following information with the bid:
 - 1. Physical arrangement showing plan, elevations, and outline dimensions of equipment.
 - 2. Approximate weights of equipment.
 - 3. Descriptive data and ratings of equipment, components, and accessories to be furnished.
 - 4. Exceptions taken to the specifications.
- C. Additional information to be furnished with bid will include a separate itemized price for each item listed below in addition to the total lump sum proposal price. Itemized prices will include all charges for incidental expenses, delivery, taxes, insurance, overhead, and profit. Itemized prices will be applicable to pricing of deletions from and/or additions to the proposed equipment. Bidder will clearly indicate the last applicable date of such unit prices and percentage increase for at least a one-year period after that date.

WPCD G1 BP07 Generator Replacement

A. Engineering services as specified herein.

D. Approval Drawings

A. Within 4 weeks after receipt of order, manufacturer will furnish for approval three sets of prints and one set of reproducible drawings which will include the following information:

1. Certified dimensions, weights, etc.
2. Descriptive data and ratings of equipment, components, and accessories to be furnished.
3. Drawings showing complete arrangement of the unit and identifying parts.
4. Schematic diagrams indicating control and alarm devices, meters, bill of material, etc.
5. Interconnection diagrams showing external connections required.

E. Final Information by Manufacturer

A. Within 2 weeks after drawings have been reviewed, manufacturer will furnish Owner the following information:

1. Three sets of paper prints, one set of mylar reproducible of certified drawings and equipment lists as specified above and complete certified wiring diagrams.
2. Six sets of installation, operation, and maintenance instructions of equipment.
3. Three complete spare parts lists.

1.6 MANUFACTURER'S GUARANTEE

A. Manufacturer will assume full responsibility for correctness and adequacy in every respect of internal wiring and connections and for electrical and mechanical coordination of devices and equipment.

B. If within 18 months after date of receiving equipment on site or 12 months after installation, defects in materials, design, construction, workmanship, or failure to meet specifications or performance becomes evident, manufacturer will repair or replace defective parts at no cost to the Owner. Work under guarantee will be performed so that it does not affect Owner's normal production, and will be coordinated with the Owner's Representative.

WPCD G1 BP07 Generator Replacement

1.7 NOTICE OF DELIVERY

- A. Manufacturer will give Owner's Representative a one-week written notice of delivery prior to shipment of any equipment so that arrangements can be made to receive same at the site.

1.8 DELIVERY TERMS

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.9 INSPECTION

- A. Material and workmanship will be subject to inspection and test after delivery to the site. If articles are found to be defective in material or workmanship, or otherwise not in conformity with specification requirements, the Owner will have the right to reject such articles or require their correction. Rejected articles requiring correction will be removed by and at the expense of the manufacturer promptly after notice to do so. If manufacturer fails to remove such articles promptly or to proceed promptly with replacement and/or correction thereof, the Owner may contract or otherwise replace and/or correct such articles and charge the cost of this work to the manufacturer.

1.10 SCHEDULE

- A. The manufacturer will state in his proposal the earliest possible date, after receipt of order, by which he can complete delivery of all equipment specified herein. The delivery date will not be later than the date indicated for time of completion in the form of proposal.

1.11 ENGINEERING SERVICES

- A. The manufacturer will furnish as part of the bid the services of a competent engineer who will assure that the equipment is in working order and is ready to be energized, and who will supervise initial energizing of the equipment.
- B. The engineer's duties will include, but not be limited to, the following.

WPCD G1 BP07 Generator Replacement

- A. Check equipment for completeness and damages and see that all internal shipping blocks are removed where applicable.
- B. Order replacement parts for missing or damaged equipment and see that all repairs are made properly.
- C. See that instruments and meters are calibrated and working properly.
- D. See that equipment is properly assembled, aligned, leveled, and installed.
- E. Make necessary tests or adjustments to assure proper operation.

1.12 WARRANTY

- A. 5-year standard warranty and a 1-year preventative maintenance contract.
 - A. Extended Service Coverage will be provided for a period of 5 years or 2500 running hours and will include no deductible. Extended Warranty Coverage provides for 100% of usual and customary parts and labor costs for failures due to defects in materials and workmanship to the “as shipped bill of material” from the factory, excluding filters, fluids, vee belts, hoses, power take-offs, paint, batteries and clutches. All repairs will be performed by factory trained dealer service personnel and allows repairer travel and mileage for all repairs up to 8 hours and 320 miles (515 km) per incident. Extended service coverage will include the ability to be extended in 5-year increments for up to 20 years total coverage.
 - B. Extended Service Coverage will include a temporary generator set in the event a covered repair will take more than 48 hours. Selling dealer must have a minimum of 100 units in its rental fleet to ensure a temporary unit is available if needed. Provide documentation as such.

1.13 MAINTENANCE SERVICE

- A. The engine generator supplier will maintain 24-hour parts and service capability within 100 miles of the project site. The distributor will stock parts as needed to support the generator set package for this specific project.
- B. Initial Maintenance Service: Beginning at Acceptance, provide 12 months' full maintenance by certified employees of manufacturer's designated service organization. Include semi-annual exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

WPCD G1 BP07 Generator Replacement

- C. Preventive Maintenance Agreement: The authorized manufacturer's dealer will provide a preventive maintenance agreement using qualified factory trained service personnel, for a period of 1-year minimum. The authorized manufacturer's dealer will provide genuine OEM parts and filters, will provide all recommended fluids, dealer labor, travel labor and travel mileage to complete the suggested preventive maintenance as defined in the manufacturer's Operation and Maintenance Manual. Includes the following fluid sampling:
1. Service Oil Sampling
 - a. Key element analysis which includes both wear metals and oil additives
 - b. Viscosity of all oils
 - c. Check for outside contamination from water, diesel fuel, or antifreeze
 - d. Oil Condition
 - e. Oil cleanliness analysis with Particle count technology
 2. Coolant Sampling
 - a. Key element analysis to determine if the coolant has the right chemical balance for maximum protection and cooling efficiency.
 - b. Sampling assesses correct usage, condition, adequate freeze/boil protection, and contamination.
 - c. Minimizes engine damage caused by overheating due to inefficient cooling
 3. Diesel Fuel Sampling
 - a. Key element analysis to ensure optimum performance of your equipment
 - b. Check for acceptable fuel quality, microbial growth, contamination, and appropriate usage.
 - c. Minimize abnormal wear of components, valves, valve guides, piston rings, and more
 - d. Minimize maintenance and operating costs.

PART 2 - PRODUCTS

2.1 ENGINE

- A. Engine will be liquid-cooled, 4 cycle (glycol base antifreeze).

WPCD G1 BP07 Generator Replacement

- B. Maximum horsepower output capacity at 1800 rpm, as certified by engine manufacturer, will be not less than 125 percent of the required BHP to ensure operation at the specified altitude and ambient conditions.
- C. The engine will be equipped with an isochronous electronic governing system capable of parallel operation with the addition of load-sharing controls. The governor will maintain isochronous frequency regulation from no load to rated load.
- D. The engine will be capable of operating at idle or light loads for extended periods of time.
- E. The engine will be provided with lead acid storage batteries and an engine-mounted battery charging alternator, 35 amperes minimum, and solid-state voltage regulator.
- F. The engine will be equipped with a dry type replaceable intake air filter.
- G. Engine will be mounted on a structural steel subbase with vibration isolators.

2.2 AUTOMATIC STARTING SYSTEM

- A. Starting system will be of sufficient capacity to crank at a speed which will start the engine under operating conditions specified. The starting system will be designed for restarting in the event of a false engine start by permitting the engine to stop completely and then re-engage the starter.
- B. The starting motor will include a DC electric starting system with positive engagement drive with motor voltage as recommended by the engine manufacturer. The starting pinion will disengage automatically when engine starts. The starting motor will be capable of three complete cranking cycles without overheating, before overcrank shutdown (75 seconds).
- C. Provide lead/acid storage battery set capable of delivering manufacturer's recommended minimum cold cranking amps with capacity sufficient to provide for 1-1/2 minutes total cranking time without recharging. Provide battery rack and necessary cables and clamps. Battery set will be suitable for indoor (and outdoor) application.
- D. Battery charger will be mounted near battery at engine.

WPCD G1 BP07 Generator Replacement

2.3 COOLING SYSTEM

- A. The engine will be cooled by a unit-mounted radiator with blower fan, water pump, thermostat, and radiator duct flange. Cooling system will have sufficient capacity for cooling the engine when delivering full rated horsepower at 120 degrees F ambient temperature with a maximum airflow restriction from the radiator of 0.5-inch H₂O.
- A. The cooling system will be filled with 50/50 ethylene glycol water mixture by the equipment supplier.
- B. Provide jacket water heaters, 120 volt or 208 volt, single phase, unit-mounted thermal circulation-type, incorporating thermostatic switch to maintain engine jacket water temperature to meet start-up requirements of NFPA 110 regulations.

2.4 LUBRICATION

- A. The engine will be supplied with a positive displacement, mechanical, full pressure, lubrication oil pump, full-flow lubrication oil filters with replaceable spin-on canister elements, and dipstick oil level indicator.
- B. Lubricating oil and filters for initial use will be furnished with the unit.

2.5 EXHAUST SYSTEM

- A. Provide an exhaust silencer rated for industrial applications and a length of double-wall stainless steel flexible exhaust pipe with male pipe thread ends and a set of threaded companion flanges.
- B. Provide thimbles where exhaust pipe penetrates wall.
- C. Exhaust pipe size sufficient to ensure that exhaust back-pressure does not exceed maximum limitations specified by generator set manufacturer.

2.6 GENERATOR

- A. Generator will be 60 Hertz at 1800 rpm, 4-pole brushless synchronous type with revolving field, self-ventilated with drip-proof construction, and static exciter. Temperature rise of the rotor and stator will be limited to Class F ratings in accordance with NEMA MG1-22.40. Neutral will be brought out to be grounded in the field.

WPCD G1 BP07 Generator Replacement

- B. Minimum ratings will be:
 - A. Output Rating: 500 kW standby (continuous at 1000 feet altitude and 120 degrees F).
 - B. Power Factor: 80 percent.
 - C. Voltage Output: 480-volt, 3 phase.
- C. Generator will have static excitation systems which incorporate silicon-controlled rectifiers to provide alternator field excitation. The static excitation system will incorporate circuitry to permit voltage build-up from residual magnetism.
- D. A static voltage regulator will be included as an integral part of the generator exciter system. Combined performance of the generator and voltage regulator will provide regulation for single unit operation of plus or minus 2 percent from rated voltage at steady state load between no load and full load.
- E. The generator will have a single maintenance-free bearing and be directly connected to the engine flywheel by use of a flexible disc-type coupling. The generator frame will bolt directly to the engine flywheel housing to ensure permanent alignment.
- F. The generator will incorporate reactive droop compensation for parallel operation and also include resettable thermal protector for exciter/regulator protection against extended low power factor loads.
- G. Generator will be twelve-lead, reconnectable, Y-connected type.

2.7 ENGINE-GENERATOR SET CONTROL PANEL

- A. Control panel will have remote start capability from associated ATS and a panel-mounted, three-position (stop, run, remote) switch.
- B. Provide cycle cranking of 15 seconds on, 15 seconds off, for three attempts (75 seconds). If engine fails to start, lock out the engine and indicate overcrank on alarm status panel.
- C. Control panel will shut down and lock out upon:
 - A. Failing to start (overcrank)
 - B. Overspeed

WPCD G1 BP07 Generator Replacement

- C. Low lubricating oil pressure
- D. High engine temperature
- E. Operation of a remote manual stop station
- D. A panel-mounted switch will reset the engine monitor and test all lamps. Lamp indications on the control panel will include:
 - A. Overcrank shutdown alarm - red
 - B. Overspeed shutdown alarm - red
 - C. Low oil pressure shutdown alarm - red
 - D. High engine temperature shutdown alarm - red
 - E. High engine temperature prealarm - yellow
 - F. Low engine oil pressure prealarm - yellow
 - G. Low coolant temperature prealarm - yellow
 - H. Low fuel supply alarm - red
 - I. Not in automatic start - flashing red
 - J. Low battery voltage alarm - red
 - K. Battery charger malfunction alarm - red
 - L. Run - green
 - M. Auxiliary (two each) - red (customer identified)
- E. Two sets of dry contacts will be provided for monitoring as a common trouble for alarms and prealarms listed in paragraph 2.9.4 above. A third and fourth set of dry contacts will be provided to monitor engine running and when the control panel selector switch is not in the "remote" position.
- F. Control panels will be mounted on the generator set with vibration isolators. A front control panel illumination lamp with an on/off switch will be provided. Control-panel-mounted indicating meters and devices will include:
 - A. 480-volt, 3 pole, LSIG adjustable trip circuit breaker rated for 100 percent continuous generator full-load current.

WPCD G1 BP07 Generator Replacement

- B. Engine oil pressure gauge.
- C. Coolant temperature gauge.
- D. DC voltmeter.
- E. Running time meter (hours).
- F. Voltage adjusting rheostat.
- G. Analog AC voltmeter, dual range, 2 percent accuracy.
- H. Analog AC ammeter, dual range, 2 percent accuracy.
- I. Analog frequency/rpm meter, 45 to 65 Hertz, plus or minus 0.6 Hertz accuracy.
- J. Seven-position phase selector switch with "off" position to allow meter display of current and voltage in each phase. When supplied with reconnectable generators, meter panel will be reconnectable for the specified voltage.

2.8 UNIT MOUNTING

- A. The complete unit will be equipped with vibration isolators and mounted on a welded steel base which will provide suitable mounting to a level surface. Mounting components will be suitable for use in a Seismic Zone 1 area.

2.9 BASIC OPERATION

- A. Upon normal power failure, a contact closure in the remote automatic transfer switch will be transferred to the auto-start unit of the engine. The auto-start unit will provide immediate starting of the engine without time delay. The unit will be capable of manual or automatic operations. The engine will be capable of starting, reaching stabilized voltage and frequency within 10 seconds.
- B. Stopping will be automatic by means of opening of contact from the remote automatic transfer switch. In the event of low oil pressure, high water temperature, or engine overspeed, the engine will stop automatically. The panel will contain a cranking limit switch adjustable to 90 seconds. In the event of any of these faults occurring, the engine will stop automatically by energizing a solenoid to shut off the fuel supply. A manual reset device must be activated prior to the next attempt to start.
- C. The panel will have a three-position selector switch marked stop, run, and remote. It is essential that the switch be in remote position for proper operation.

WPCD G1 BP07 Generator Replacement

2.10 TESTING, CALIBRATION, AND ADJUSTMENT

- A. Equipment manufacturer will provide the services of a qualified Field Engineer and the necessary tools and equipment to test, calibrate, and adjust settings of controls, alarms, and protective devices as required for the generator set and associated transfer switches.
- B. Manufacturer's Assistance: Contractor will include in the contract price, at time of bid, the cost of providing the services of a competent manufacturer's engineer who will ensure that the equipment is in working order and ready to be energized and who will supervise initial energizing of the equipment.
- C. The engineer's duties will include, but not be limited to, the following:
 - A. Check equipment for completeness and damage and see that internal shipping blocks are removed where applicable.
 - B. Order replacement parts for missing or damaged equipment and see that repairs are made properly.
 - C. See that equipment is properly assembled, aligned, leveled, and installed.
 - D. Make necessary test or adjustments to ensure proper operation.

2.11 ACCEPTABLE MANUFACTURERS

- A. Cummins/Onan Corp.
- B. Caterpillar Corp.
- C. Kohler Corp.
- D. Generac Power Systems

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

WPCD G1 BP07 Generator Replacement

- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions, NFPA 110 and all local codes
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch. (25.4 mm),
- D. Install black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping will be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Section "Hydronic Piping."
 - A. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Section "Hydronic Piping."
- E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Electrical wiring includes but is not limited to battery chargers, heaters, control power, load bank, grounding, remote annunciator panels, paralleling gear, remote control panels, etc. Contractor to include as part of their scope of work, wall wiring and empty conduit indicated on contract drawings, specified herein, indicated/noted on approved manufacturers shop drawings and as required to provide a fully functional system.

3.3 CONNECTIONS

- A. Piping installation requirements are specified on mechanical drawings. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- C. Connect cooling-system water piping to engine-generator set and with single braid corrosion resistant type 302 stainless steel wire braid and compression fittings.
- D. Connect engine exhaust pipe to engine with stainless steel flexible connector.
- E. Connect fuel piping to engines with a gate valve and union and stainless-steel flexible connector. Provide all required fire safe-off and solenoid valves.

WPCD G1 BP07 Generator Replacement

- F. Connect to SCADA, coordinate with controls contractor.
- G. Ground equipment according to Section "Grounding and Bonding for Electrical Systems."
- H. Connect wiring according to Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 IDENTIFICATION

- A. Identify system components according to mechanical drawings and Section "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Field Testing: If factory service technicians cannot provide the field testing specified as part of manufacturer's start-up, the contractor will engage a qualified factory certified and authorized testing agency to perform tests and inspections and prepare test reports required by manufacturer.
- B. Manufacturer's Field Service: Contractor to include field services of factory-authorized service representatives to provide start-up testing as well as to assist in 3rd party system commissioning as specified under the system commissioning specifications. Testing will not be concurrent so multiple travel days will be included in the approved schedule.
- C. Perform tests and inspections and prepare test reports.
- D. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters. Generators will be tested individually and in parallel.
 - 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
 - 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.

WPCD G1 BP07 Generator Replacement

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 6. Exhaust Emissions Test: Comply with applicable government test criteria to confirm adherence to EPA Tier rating.
 7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50% and 100% step-load increases and decreases and verify that performance is as specified.
 8. Harmonic-Content Tests: Measure harmonic content of output voltage under 25% and at 100% rated linear load. Verify that harmonic content is within specified limits.
 9. "Pull the Plug Test": Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers will be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator set voltage, amperes, and frequency will be monitored throughout the test.
- E. Coordinate tests with tests for transfer switches and run them concurrently.
- F. Test instruments will have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- G. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- J. Remove and replace malfunctioning units and retest as specified above.
- K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

WPCD G1 BP07 Generator Replacement

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators, load bank and associated switchgear operations.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes automatic transfer switches rated 600 V and less.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA ICS 1.
- C. Comply with NFPA 70.
- D. Comply with NFPA 99.
- E. Comply with NFPA 110.
- F. Comply with UL 1008 unless requirements of these Specifications are stricter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Contactor Transfer Switches:
 - a. Caterpillar; Engine Div.
 - b. Kohler Power Systems; Generator Division.
 - c. Onan/Cummins Power Generation; Industrial Business Group.
 - d. Russelectric, Inc.
 - e. Generac Power Systems

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

WPCD G1 BP07 Generator Replacement

- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
- C. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- D. Battery Charger: For generator starting batteries.
 - 1. Float type rated 10 A.
 - 2. Ammeter to display charging current.
 - 3. Fused ac inputs and dc outputs.
- E. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 2 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers recommendations.
- B. Identify components according to Division 26 Section "Identification for Electrical Systems".
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems".
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables".

WPCD G1 BP07 Generator Replacement

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Coordinate with tests of generator and run them concurrently.
- C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 263600

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Provide lighting systems as indicated. Systems will include luminaires, supporting members, hangers, associated ceiling-mounted components, LEDs, and controls. Refer to schedule on drawings for luminaire descriptions.
- B. Work includes, but is not limited to, the following:
 - 1. Luminaires.
 - 2. Poles and bracket arms
 - 3. Formed-in-place concrete foundations
 - 4. Fuses.
 - 5. LED's.
 - 6. Lighting control systems.

1.2 ABBREVIATIONS:

- A. LED – Light Emitting Diode

1.3 SUBMITTALS

- A. Submittals will be neatly bound, organized and identified by luminaire type.
- B. For Bid Substitution
 - 1. Product data literature.
 - 2. LED wattage including driver.
 - 3. Detailed Manufacturer's Specifications and Warranty.

WPCD G1 BP07 Generator Replacement

4. Test Reports:

- a. IES file to IESNA LM-79 Standard.
- b. IES file to IESNA LM-80 Standard.
- c. IES file to TM-21-11 Standard.
- d. Lumen depreciation curves correlating to Chip manufacturer's LM-80 test.
- e. UL Listing.

C. For Acceptance Review

1. Submit detailed shop drawings, including catalog cuts, catalog order number, dimensions, and voltage.

PART 2 – PRODUCTS

2.1 LEDs

- A. Provide LEDs for all luminaires in accordance with requirements of luminaire schedule.
- B. LEDs will be new and unused prior to installation, and will be replaced if damaged, defective or stolen until the time installation is turned over to Owner for use.

2.2 LIGHTING FIXTURES

- A. Will be in accordance with NFPA, UL, as shown on drawings, and as specified.
- B. Sheet Metal:
 1. Will be formed to prevent warping and sagging. Housing, trim and lens frame will be true, straight (unless intentionally curved), and parallel to each other as designed.
 2. Wireways and fittings will be free of burrs and sharp edges and will accommodate internal and branch circuit wiring without damage to the wiring.
 3. When installed, any exposed fixture housing surface, trim frame, door frame, and lens frame will be free of light leaks.
 4. Hinged door frames will operate smoothly without binding. Latches will function easily by finger action without the use of tools.

WPCD G1 BP07 Generator Replacement

- C. Drivers and LED Modules will be serviceable while the fixture is in its normally installed position. Drivers will not be mounted to removable reflectors or wireway covers unless so specified.
- D. Recessed fixtures mounted in an insulated ceiling will be listed for use in insulated ceilings.
- E. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housing, etc.) will be retained in a secure manner by captive screws, chains, aircraft cable, captive hinges, or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- F. Metal Finishes:
 - 1. The manufacturer will apply standard finish (unless otherwise specified) over a corrosion-resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes will be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish will be free of stains or evidence of rusting, blistering, or flaking, and will be applied after fabrication.
 - 2. Interior light reflecting finishes will be white with not less than 85 percent reflectance, except where otherwise shown on the drawing.
 - 3. Exterior finishes will be as shown on the drawings.
- G. Lighting fixtures will have a specific means for grounding metallic wireways and housings to an equipment grounding conductor.
- H. Lighting fixtures in hazardous areas will be suitable for installation in Class and Division areas as defined in NFPA 70.
- I. Provide 10 Year Warranty on assembled luminaire.

2.3 INDOOR LIGHTING LUMINAIRE

- A. General Description:
 - 1. LED light fixtures will be in accordance with IES, NFPA, UL, as shown on the drawings, and as specified.
 - 2. LED light fixtures will be Reduction of Hazardous Substances (RoHS)-compliant.

WPCD G1 BP07 Generator Replacement

3. LED drivers will include the following features unless otherwise indicated:
 - a. Minimum efficiency: 85% at full load.
 - b. Minimum Operating Ambient Temperature: -20° C. (-4° F.)
 - c. Input Voltage: 120 - 277V, or 480V (±10%) at 60 Hz.
 - d. Integral short circuit, open circuit, and overload protection.
 - e. Power Factor: ≥ 0.95.
 - f. Total Harmonic Distortion: ≤ 10%.
 - g. Comply with FCC 47 CFR Part 15.
4. LED modules will include the following features unless otherwise indicated:
 - a. Comply with IES LM-79, LM-80, and TM-21-11 requirements.
 - b. Minimum CRI 80 and color temperature 3000° K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
 - c. Minimum Rated Life: 50,000 hours per IES L70.
 - d. Light output lumens as indicated in the LIGHTING FIXTURE SCHEDULE.

B. LED Downlights:

1. Housing, LED driver, and LED module will be provided by same manufacturer as a complete product.

C. LED Troffers:

1. LED drivers, modules, and reflectors will be accessible, serviceable, and replaceable from below the ceiling.
2. Housing, LED driver, and LED module will be products of the same manufacturer.

2.4 EMERGENCY LIGHTING:

- A. Provide emergency lighting fed from life safety portion of emergency power system as shown on plans.
- B. Test emergency lighting transfer by removing normal power and insuring emergency lighting transfers to generator within 10 seconds. For battery backup transfer will be immediate.

WPCD G1 BP07 Generator Replacement

- C. Provide emergency units with self-contained battery power supplies as indicated. All equipment will conform to UL924-Emergency Lighting and Power Equipment.
- D. Battery will be sealed, maintenance-free lead-acid type (indoors) or nickel-cadmium (outdoors or unconditioned spaces) with 10-year nominal life. Unit will incorporate a fully automatic solid state charger and automatic transformer relay to transformer to backup battery power supply upon failure of normal power.
- E. All battery backup emergency lighting equipment will be equipped with means to test operation and an LED indicating battery status at an accessible location.

2.5 FUSES

- A. Provide integral fusing for canopy mounted luminaires.
- B. Provide in-line pull-apart fuse holders with fuses inside pole for pole mounted luminaires. Fuse holders will be accessible from pole handhole.

2.6 LIGHTING CONTROL SYSTEMS

- A. Provide automatic control of lighting systems as indicated. Types are as follows:
 - 1. Lighting contactors rated 480 volts with ampere ratings as shown and will be suitable for application on loads consisting of 100 percent LED lighting and have 120-volt coils. Contactors will be electrically held with quantity of poles as indicated or as required by circuit connections. Provide photocell control of lighting contactors with provisions for NEMAC system override.
 - 2. Photocells will be outdoor type in weatherproof enclosure, heavy duty construction with adjustable light-sensing device and rating as required by load being controlled.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Support luminaires from structure of the building, independent from the ceiling membrane or finish material. Luminaire will be set level, plumb, and square with ceilings and walls.

WPCD G1 BP07 Generator Replacement

- B. Recessed lay-in luminaires in suspended grid ceilings will be supported from the ceiling grid. Provide devices for securing the luminaire to the ceiling grid to comply with the National Electrical Code ("earthquake clips"). Luminaires heavier than 30 pounds will have supplemental support wires anchored to the structure above the ceiling. Provide independent support wires, anchored to structure above and attached to fixture at each corner.
- C. Recessed luminaires in fire-rated ceiling assemblies will be installed in accordance with the UL listing of the assembly.
- D. Recessed luminaires (non-lay-in or hard ceiling types) will be supported by $\frac{3}{4}$ " steel ceiling channel or factory-supplied hanger bars one on each side of the luminaire, anchored to ceiling structure. Recessed luminaires heavier than 20 pounds will have supplemental support anchored to the structure above the ceiling. Do not use conduit to support luminaire.
- E. Provide recessed luminaires with appropriate frames, hardware and trim for the ceiling installed.
- F. Install luminaires free and clear of structural and mechanical interferences above the ceiling. If location indicated on the drawing conflicts with other elements, notify the Architect for directions for remedial action.
- G. Attach surface and pendant mounted luminaires to $\frac{3}{16}$ " fixture stud in outlet box. Luminaires in excess of 20 pounds will have supplemental support anchored to the structure above the ceiling.
- H. Luminaires surface mounted to grid-type ceilings will be mounted with Caddy IDS type clips anchored to structure above.
- I. Wall mounted luminaires will be anchored to wall structure. Luminaire will fully conceal the outlet box.
- J. Wiring to luminaires will be with flexible metallic conduit to junction box. Do not wire luminaire to luminaire unless noted otherwise, or if using manufactured wiring systems.
- K. Individual flexible connections under 6 feet in length will consist of 2#14 and 1#14 (ground) in $\frac{3}{8}$ " flexible metallic conduit (for circuits 20A or less). Bond ground wire and conduit at each end.
- L. Recessed luminaires in insulated ceilings will be installed so that insulation is no less than 3 inches away from the fixture enclosure unless the luminaire is listed for direct contact with insulation (IC rated).

WPCD G1 BP07 Generator Replacement

- M. Provide equipment, labor and materials, as needed for final aiming of adjustable luminaires. Aiming will take place immediately before final occupancy by the Owner.
- N. Reflectors, trim cones, and other visible trim of luminaires will not be installed until completion of ceiling work, and will be clean and free of dust, fingerprints, scratches, dents etc. upon substantial completion.

END OF SECTION 265100

SECTION 330900 – GENERATOR FUEL PUMP CONTROL PANEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This Section covers the general requirements for furnishing, installing, programming, adjusting, testing, documenting, and commissioning of complete and operational PLC based control systems. The control system includes (1) one PLC control system, communications, control devices, motor control, instrumentation panel for complete control and monitoring of the Generator Fuel Transfer System. The control system shall be integrated into the Owner's SCADA system.
- C. Provide a complete UL 508A industrial control panel for controlling (2) two generator fuel transfer pumps used to transfer fuel from a main fuel storage tank to (2) two day fuel tanks (1 per generator).
- D. Main and Day fuel tanks require level instrumentation.
- E. This Section applies to the following control systems and panels:
 - 1. Generator Fuel Pump Control Panel
- F. Related Section:
 - 1. Section 26 00 01 – Electrical Systems (Construction Contract)

1.2 REFERENCES

- A. 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:
 - 1. IEEE C37
 - 2. IEEE C62.41 Surge Voltages in Low-Voltage AC Power Circuits
- B. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)
 - 2. NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches
 - 3. NEMA ICS 1 Industrial Controls and Systems
 - 4. NEMA ICS 2 Industrial Control Devices, Controllers and Assemblies
 - 5. NEMA ICS 4 Industrial Control and Systems: Terminal Blocks
 - 6. NEMA ICS 6 Enclosures for Industrial Control and Systems
 - 7. NEMA ST1 Standard for specialty transformers

C. National Fire Protection Association (NFPA)

1. NFPA 30 Flammable and Combustible Liquids Code
2. NFPA 70 National Electrical Code
3. NFPA 110 Emergency Generators
4. NFPA 780 Installation of Lightning Protection Systems

D. Underwriters Laboratories (UL)

1. UL 50 Enclosures for Electrical Equipment
2. UL 83 Thermoplastic-Insulated Wires and Cables
3. UL 94 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
4. UL 98 Disconnect Switches
5. UL 444 Standards for Communication Cables
6. UL 467 Grounding and Bonding Equipment
7. UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
8. UL 489 Molded-Case Circuit Breakers and Circuit-Breaker Enclosures
9. UL 508 The Standard for Industrial Control Equipment
10. UL 508A Outline of Investigation for Industrial Control Panels
11. UL 698 Industrial Control Equipment for Use in Hazardous (Classified) Locations
12. UL 886 Outlet Boxes and Fittings for Use in Hazardous Locations
13. UL 913 Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division I Hazardous Locations
14. UL 1063 Machine Tool Wires and Cables
15. UL 1092 Process Control Equipment
16. UL 1203 Explosion Proof and Dust Ignition Proof Electrical Equipment for Use in Hazardous Locations
17. UL 1449 Standard for Transient Voltage Surge Suppression
18. UL 1604 Electrical Equipment for Use in Hazardous Locations, Class I and Class II, Division 2 and Class III, Divisions 1 and 2
19. UL 1778 Uninterruptible Power Supply Equipment
20. UL 2225 Standard for Metal-Clad Cables and Cable Sealing Fittings for Use in Hazardous Locations
21. UL 2279 Electrical Equipment for Use in Class I, Zone 0, 1, and 2 Hazardous Locations

1.3 DEFINITIONS OF TERMS

A. BOM – Bill of Materials

- B. CB – Circuit Breaker
- C. Contractor – Control Panels Fabricator/Controls Integrator
- D. CP – Control Panel
- E. HOA – Hand Off Auto
- F. IFB – Issued For Bid
- G. IFC – Issued For Construction
- H. I/O – Control Input and Output Signals
- I. FAT – Factory Acceptance Test
- J. GFP – Generator Fuel Pump Control Panel
- K. HMI – Human Machine Interface Screen
- L. MFG – Manufacturer
- M. OEM – Original Equipment Manufacturer
- N. OL - Overload
- O. O&M – Operations and Maintenance
- P. PB - Pushbutton
- Q. PCP – Pump Control Panel
- R. PS – Pump Station
- S. CR – Control Relay
- T. SAT – Site Acceptance Test
- U. SS – Selector Switch

1.4 SPECIAL REQUIREMENTS

- A. All Scope of Work shall be provided under the supervision of a single Contractor
- B. The Contractor shall be specialized in the design, assembly, programming, testing, installation, and service of PLC control systems for at least the last (8) eight years. Contractor shall provide supporting documentation with their bid demonstrating this requirement.
- C. The Contractor shall employ technical and professional staff with documented experience in the design, assembly, programming, testing, installation, operation, troubleshooting,

and service of PLC control systems. Contractor shall provide supporting documentation on their staff with their bid demonstrating this requirement.

- D. The Contractor shall be experienced with the programming and commissioning of the respective Ethernet PLC and Motor Control systems. Contractor shall provide supporting documentation with their bid demonstrating this requirement.
- E. The Contractor shall become familiar with all details of the work and verify any required dimensions and distances. Contractor shall understand and document, as needed, any existing power panels, field wiring, instrumentation, and field devices. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change.

1.5 STANDARD PRODUCTS

- A. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least (5) years prior to bid opening.

1.6 MATERIALS AND EQUIPMENT

- A. The label or listing of the Underwriters Laboratories, Inc., shall be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted. However, materials and equipment installed in hazardous locations must bear the UL label unless the data submitted from another testing agency is specifically approved in writing by the Owner. Materials and equipment shall be approved based on the manufacturer's published data. For other than equipment and materials specified to conform to UL publications, a manufacturer's statement indicating complete compliance with the applicable Federal Specification, or standard of the American Society for Testing and Materials, National Electrical Manufacturers Association, or another commercial standard, is acceptable.

1.7 RESPONSIBILITIES

- A. The Contractor shall be fully and completely responsible for all work performed and all materials installed under the contract. All contracts between the Contractor and subcontractor(s) shall conform to and meet all requirements specified in the contract documents.
- B. The Contractor shall be responsible for, but not limited to:
 - 1. Contractor shall design respective Control Panel drawings in AutoCAD, including back panel layout, front door layout, Bill of Materials, power distribution and grounding, motor control, PLC input and output card drawings, network/system architecture.

2. Contractor shall furnish, assemble, test, and install the control system in accordance with approved Submittals, respective design drawings, specifications, and testing requirements.
3. Contractor shall create and test all custom PLC and communications user programs for the control system.
4. Contractor shall provide Submittals as outlined.
5. Contractor shall ensure that network communication is online and fully functioning with the existing Owner's network and Owner's SCADA as part of system commissioning.
6. Contractor shall coordinate, lead, and execute the SAT onsite.
7. Contractor shall redline control system design drawings with any changes made during construction SAT, and operational testing for updating and delivery of final as-built drawings.
8. Contractor shall provide Spare Parts as outlined.
9. Contractor to provide all electrical permits and inspections as required by the State, County, and City.
10. Contractor shall provide (1) one day of onsite system training for the Owner. Training shall be on regular business days from 8 am to 3:00 pm.

1.8 SUBMITTALS

A. Shop Drawings

1. Contractor shall submit manufacturers' data sheets for Owner review and consideration, and any material, part, or equipment substitutions/modifications requests prior to making a change.
2. Contractor shall submit for Owner review and consideration any material, part, or equipment substitutions/modifications requests prior to making a change.

B. Submittals

1. Contractor shall prepare a complete shop drawing submittal of all (specified or substituted) components, devices, instruments, and equipment, including fully detailed shop drawings, catalog cuts, wiring connections, and such other documentation as may be required to fully describe the equipment and to demonstrate its conformity to these plans and specifications. Catalog information shall be submitted for all components and equipment required for the project.
2. All submittals shall be complete, organized, and indexed. Partial submittals will not be accepted. Submit an electronic copy in PDF.
3. Owner review and approval are required on all shop drawings.

C. Submittal - Control Panel Drawings

1. Following approval of the shop drawing submittals, the Contractor shall provide a complete set of each respective Control Panel set of drawings prior to shipping. Submit an electronic copy in PDF.

D. Submittal - PLC Data Map to/from Owner's SCADA

1. The Contractor shall provide a list in Excel, including tag name, description, register, and units. Indicate if it's a Read or Written value/bit. Submit an electronic copy in PDF.

E. Submittal - SAT Test Plan

1. Contractor shall submit an electronic copy in PDF of the SAT plan, description, and test execution spreadsheets that will be executed.

1.9 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance (O&M) data for the completed control system. Provide (2) two copies of the O&M manual in a three-ring binder and in PDF electronic format. The O&M manual shall include:

1. All system equipment, components, and device product cutsheets with actual part number and options highlighted.
2. By Control System Panel - control panel functions and indicator descriptions.
3. By Control System Panel - operations and procedures.
4. Troubleshooting section for control procedures
5. Steps to restarting the PLC system from a cold start, such as utility power failure, UPS failure/battery drain.

1.10 SPARE PARTS

A. Spare parts shall be furnished as specified below. Provide a Spare Parts line item cost. All spare parts shall be the same make, model, # and options as the respective approved part in the submittals. Spare parts shall be furnished new in OEM packaging.

1. PLC CPU (Qty. 1 of each type used) with program preloaded on a flash card
2. PLC Output Card (Qty. 1 of each type used)
3. PLC Input Card (Qty. 1 of each type used)
4. PLC Analog Input Card (Qty. 1 of each type used)
5. Control Panel UPS (Qty. 1 of each type used)
6. 24 VDC Power Supply (Qty. 1 of each type used)
7. Motor Starter (Qty. 1 of each type/size used)
8. Ethernet Switch (Qty. 1 of each type used)
9. Fuses (Qty. 10 of each type/size used)
10. Level Switch/Float (Qty. 1 of each type used).

PART 2 - PRODUCTS

2.1 GENERAL

- A. Material shall be new, free from defects, and of the quality specified. All equipment and materials utilized in the system shall be the products of manufacturers with a minimum of (8) eight years of experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same manufacturer. All equipment shall be of industrial grade and shall be specifically intended for control, monitoring and operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing.

2.2 MAJOR EQUIPMENT LIST

- A. Provide all equipment and devices shown on the drawings and specified herein, including but not limited to, the following major Control System equipment:
 - 1. PLC Control Panel
 - 2. All required instrumentation

2.3 PLC CONTROL PANELS

- A. Similar items in the system shall be products from the same Manufacturer.
- B. Material shall be new, free from defects, and of the quality specified. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring industrial equipment.
 - 1. Control Panel Identification Nameplates
 - a. Nameplates shall be furnished for all door-mounted devices. Nameplates shall be duralith or micarta with black letters on a white background. Letters shall be 3/16" high with seven (7) letters per inch, except where indicated otherwise. Engraving shall be done with a blunt tool to provide clear, wide lines. Refer to the design drawings for the control panel front door nameplate schedule.
 - b. All components mounted on the interior removable panel shall have identification adjacent to each device, using the same material as the paragraph above, except black letters on a yellow background. The nameplate shall identify the device and schematic device number. The nameplates shall be located to provide an unobstructed view of the nameplate after wiring is complete. All identification nameplates shall have chamfered edges and fastened with stainless steel round head sheet metal screws.
 - 2. Control Panel Enclosures
 - a. The enclosures shall be a UL-listed enclosure constructed to NEMA 4 painted steel specifications. All doors shall have a locking hasp or a key lock handle. Provide two keys per lock. The enclosure back panel shall include a 20% additional capacity for future components. A removable white painted steel inner panel shall be provided for the mounting of equipment devices. A print

holder shall be provided inside the door. Removable lifting means shall be provided to facilitate handling of all panels weighing over 200 pounds or exceeding 10 cubic feet in volume.

- b. The enclosure shall be wall or floor mounted. Where floor mounted, provide the enclosure manufacturer's stand kit of the same material where the enclosure does not come with integral feet.
- c. Contractor shall determine enclosure height, width, and depth based on back-panel and front door-mounted devices.
- d. Contractor shall verify available wall space for the width and height. The enclosure shall not impede or require the removal or modifications of existing systems, structures, equipment, and utilities.
- e. Contractor shall verify available floor/panel pad space for the width and depth. The enclosure footprint shall not impede or require the removal or modifications of existing systems, structures, equipment, and utilities.
- f. The enclosure shall be mounted to the contractor's equipment and not require wall or floor space.
- g. Saginaw or Approved Equivalent

3. Control Wiring

- a. Wire shall be color-coded as follows:
 - 1) AC Line & Load: Black
 - 2) AC Control: Red
 - 3) Neutral: White
 - 4) DC + Power: Blue
 - 5) DC Control: Blue
 - 6) DC - Common: White/blue stripe
 - 7) Mechanical Ground: Green or Green/Yellow Stripe
 - 8) Control Wiring Powered from Other Sources: Yellow
- b. Conductor size shall be #14 or larger (as required). All control, interface, and power wire terminating in the respective control panel shall be stranded wire type MTW or SIS, heavy wall, except where otherwise indicated. DC control wiring shall be stranded #16 AWG or larger except where otherwise indicated.
- c. All instrumentation and analog shielded cables shall be stranded #18 AWG with a 100% coverage shield and drain wire, 150 volt insulation except where otherwise indicated. Terminate and ground shield and drain wire as indicated on drawings. All wiring shall be copper conductors.

4. Terminal Blocks

- a. Terminal blocks shall be sized to accept wires terminating there on with a minimum of 250Vac rating at 15 amps. Terminal blocks shall be suitable for high-rise DIN rail mounting. The blocks shall have tin-plated copper alloy terminals and a marking surface for circuit identification.
- b. Three-level terminal level blocks shall be used for analog I/O shield terminations.
- c. Two-level common connection terminal blocks shall be used for DC circuit distribution.
- d. Terminal block color shall be as outlined on the design drawings. All terminal blocks shall be from the same manufacturer.

5. Wiring Duct and Cover
 - a. The wiring duct and cover shall be constructed of white rigid vinyl (PVC). The wiring duct shall have angled and interlocking lips to permit the duct cover to interlock with the duct. The wiring duct size shall be as indicated on the drawings. Wiring duct and covers shall be from the same manufacturer.
6. High Rise DIN Rail
 - a. High-rise mounting rail shall be used for all terminal block mounting. The rail shall be constructed of aluminum with a height of 2 to 3 inches. The rail shall be designed for use with DIN rail terminal blocks.
7. Standard Rail
 - a. Standard DIN rail shall be used to mount all DIN mountable devices except terminal blocks. The standard DIN rail shall be constructed of rigid aluminum or zinc-plated steel. The rail shall be designed for use with all rail-mounted panel components.
8. Control Panel Enclosure Fan(s) & Vents
 - a. Contractor shall determine if fan and vent units are required and are applicable to the installation location and environment.
 - b. The contractor shall determine fan size (CFM) based on the calculated total heat load of the respective panel components and the highest ambient temperature of the panel location.
 - c. The fans and vents shall have an outer removable stainless-steel cover with a replaceable type filter element. Provide one spare filter element per unit.
 - d. Fan package shall be from the Enclosure Manufacturer
9. Control Panel Thermostats (required when a fan, AC, or heater is installed)
 - a. One thermostat shall be used for an input to the PLC for "Panel High Temperature" alarm. Others as required for control of utilized heating and cooling hardware as required.
 - b. The control panel thermostat shall be a self-contained unit designed for use in control panel enclosures and DIN rail mounting. It shall have a minimum of one normally open contact rated for 120Vac at 1A inductive load. It shall have a minimum set-point adjustment from 40 degrees F to 90 degrees F. The thermostat shall have screw-type connections.
10. Safety Relay for E-Stop or ESD Circuit
 - a. The control relay coil voltages shall be 24Vdc. Dual safety input. Automatic and Manual reset options. Minimum of 3 output contacts rated at AC-15: 1.5 A @ 250 Vac, DC-13: 2 A @ 24Vdc. Cross-fault detection, Safety Category 4 and SIL 3. DIN rail mount.
 - b. Allen Bradley Guardmaster or Approved Equivalent
11. Control Relays
 - a. The control relay coil voltages shall be 24Vdc. The relays shall be socket-type terminals with a mating socket base. The socket base shall be suitable for DIN rail mounting and have pressure plate screw terminal connections. The relays shall have a minimum of two Form C contacts, rated for a minimum of 8 amps each at 120 VAC. The contacts shall be gold. The relay shall have an ON/OFF indicator. The overall dimensional data will not

- require adjusting the design drawing layout. All control relays shall be from the same manufacturer.
- b. Allen Bradley or Approved Equivalent
- 12. Control Panel Receptacle
 - a. The control panel receptacle shall be a 120VAC 15 AMP receptacle mounted inside the control panel enclosure and designed for panel mounting.
 - 13. 120 Vac Single-Pole Circuit Breakers
 - a. The single-pole breakers shall be a thermal magnetic type rated for 10KA short-circuit interrupt current at 120 Vac. The unit shall be rated for a minimum of 230VAC operating voltage and have a minimum electromechanical life of at least 20,000 cycles. The circuit breaker shall have finger and hand-touch-safe screw-type connections and be designed for DIN rail mounting. Single-pole circuit breakers shall be from the same manufacturer.
 - 14. 24 Vdc Single Pole Circuit Breakers
 - a. The single pole breakers shall be a thermal magnetic type rated for 10KA short circuit interrupt current at 250 Vdc. The unit shall be rated for 125 Vdc and have a minimum electromechanical life of at least 20,000 cycles. The circuit breaker shall have finger and hand touch safe screw type connections and designed for DIN rail mounting. Single pole circuit breakers shall be from the same manufacturer.
 - 15. Network Switch
 - a. The Ethernet switch shall have (4) four RJ45 ports supporting a transmission speed of 10/100 Mbps. Front-facing diagnostic/status LEDs. The unit is designed for direct DIN rail mounting. The overall dimensional data, including cooling space as required by the manufacturer, will not require adjusting the design drawing layout. Rated for installation with adjacent components on the DIN rail without derating. MTBF greater than 80 years/700,000 hours at 25 Deg C operating. Minimum operating temperature range -10 Deg C to 60 Deg C.
 - 16. 24 Vdc Power Supplies
 - a. The 24 Vdc power supplies shall be 120 Vac powered and provide 24 Vdc and be sized in amps to power devices with a minimum of 25% spare current capacity output. The 24 Vdc output shall be adjustable from 24 to 28 Vdc. Maximum DC ripple of 50 mV peak to peak. Designed for direct DIN Rail mount. Rated at full current output up to an enclosure temperature of 40 Deg C. Designed to be installed with no air gap between adjacent DIN rail-mounted devices. Power supply shall have a dry contact output for the power supply OK status. MTBF greater than 80 years/700,000 hours at 25 Deg C operating. Minimum operating temperature range -10 Deg C to 60 Deg C.
 - b. Sola or Approved Equivalent
 - 17. Uninterruptible Power Supply
 - a. The uninterruptible power supply shall be rated for 120VAC with a 750VA capacity. The unit shall be a self-contained unit with a 3-foot, NEMA 5-15P male plug and a minimum of 2 battery/surge receptacles. The unit shall have

an input voltage window from 80VAC to 150VAC for utility operation. The unit shall compensate for utility under-voltage (90VAC to 105VAC) by boosting the output. The unit shall compensate for utility over-voltage (125VAC to 140VAC) by decreasing the output. When running on battery, the unit shall provide 115VAC output with a maximum +/- 8% allowable deviation at 60Hz with a maximum +/- 0.1 Hz deviation. The transfer time shall be a maximum of 6 ms. The unit shall have an online circuit breaker and an internal battery with internal current limiting. The batteries shall be hot-swappable, sealed, maintenance-free lead-acid type. The maximum recharge time shall be 5 hours from a completely discharged state. The unit shall have indicator lights for "online", "on battery", "UPS overloaded", and "replace battery". There shall be an audible alarm for "on battery", "low battery", and "overload". The unit shall have full-time EMI and RFI filtering and surge protection. The UPS shall be located at the bottom of the control panel enclosure and sized such that it doesn't obstruct or interfere with the view or adjustment of back panel and front door-mounted devices.

b. APC or Approved Equivalent

18. Control Panel Pilot Lights

a. Pilot lights shall be 24Vdc rated with high-intensity LED cluster lamps. The units shall have the same NEMA rating as the control panel enclosure. The pilot light shall have a minimum diameter of 30mm, NEMA style. The LED cluster and lens shall be of the same color. The LED cluster and lens shall be field removable for future replacement. Where front door-mounted pilot lights are provided, the color of the pilot light shall follow this methodology:

- 1) Control Power On – Green
- 2) Fuel Transfer Pump 1 Overload/Fault – Red
- 3) Fuel Transfer Pump 2 Overload/Fault - Red
- 4) Fuel Transfer Pump 1 Run – Green
- 5) Fuel Transfer Pump 2 Run – Green
- 6) Main Fuel Tank Minimum Level – Red
- 7) Main Fuel Tank High Level – Red
- 8) Main Fuel Tank Leak– Red
- 9) Fuel Day Tank #1 Leak– Red
- 10) Fuel Day Tank #2 Leak– Red

b. Pilot Lights shall be from the same manufacturer and model type as other front door-mounted devices on all control panels.

c. Allen Bradley or Approved Equivalent

19. Control Panel Pushbuttons

a. The pushbuttons shall have a minimum of two normally open and two normally closed contacts rated for 7 amps at 120VAC. The contacts shall be field removable for future replacement. The unit shall be rated for a minimum of 1 million cycles. The pushbutton shall be a flush operator. The pushbuttons shall be rated for NEMA 4/4X and a minimum of 30 mm in diameter. Where front door-mounted pushbuttons are provided, the color of the pushbutton shall follow this methodology:

- 1) Emergency Stop – Red Mushroom Head, Maintained Operator

- b. Pushbuttons shall be from the same manufacturer and model type as other front door-mounted devices on all control panels.
 - c. Allen Bradley or Approved Equivalent
20. Control Panel Two/Three Position Selector Switches
- a. Position selector switches shall have a minimum of two normally open and two normally closed contacts rated for 7 amps at 120VAC. The contacts shall be field removable for future replacement. The unit shall be rated for a minimum of 1 million cycles. The unit shall be a two-position maintained operator with the key lock in both positions. The units shall have the same NEMA rating as the control panel enclosure. They shall have a minimum diameter of 30mm, NEMA style. Provide a “no-spin” locking ring washer.
 - b. Three-position selector switches are required for all motors, pumps, and motor-operated devices to facilitate HAND OFF AUTO mode control.
 - Fuel Transfer Pump #1 HAND OFF AUTO (Black)
 - Fuel Transfer Pump #2 HAND OFF AUTO (Black)
 - c. Selector switches shall be from the same manufacturer and model type as other front door-mounted devices on all control panels.
 - d. Allen Bradley or Approved Equivalent
21. Motor Starters
- a. Motor starters shall be NEMA rated starters. The overload and starter shall be intended to be used together by the manufacturer. The starter shall have an auxiliary N.O. contact for the PLC to monitor the running status of the starter. The motor starter coil shall be 24Vdc unless otherwise specified. The starter contacts shall be rated for a minimum of 1 million cycles at intended current usage for the AC-3 category. IEC type motor starters shall be sized with a 30% additional current load capacity.
 - b. Allen Bradley or Approved Equivalent
22. Motor Overloads
- a. The overload and starter shall be intended to be used together by the manufacturer. The overload shall electrically interlock the starter with an N.C. contact. The overload shall have an auxiliary N.O. contact for the PLC to monitor the overload status of the motor overload and an additional contact to interlock the starter from being energized. The overload shall have an adjustable trip range to allow field setting of the trip.
 - b. Allen Bradley or Approved Equivalent
23. AC Motor Current Sensing Relay
- a. The CT sensing relay shall be a panel-mounted enclosed device with a CT loop to monitor one phase of the motor. The sensing relay shall be self-powered and not require adjustment or calibration. The relay shall be sized according to the respective motor current it will be monitoring. The switch shall close when it detects the required motor current, indicating a run condition. This switch is required for all motors controlled by motor starters. Each respective switch shall be monitored by the PLC digital input.
 - b. RK Electronics or Approved Equivalent
24. Main Disconnect

- a. The panel main disconnect shall be a flange-mount type suitable for direct mounting on the enclosure manufacturer's flange mount knockout. The disconnect handle shall be a flexible cable type with all required mounting and cable operator hardware. The disconnect shall be a non-fusible type, complete with the manufacturer's rated line and lug kits. The operator handle shall be all metal with an equal or better NEMA rating than the panel enclosure. Current and voltage rating of the disconnect shall be as required based on the total motor and control panel load.
 - b. Square D or Approved Equivalent
- 25. Main Circuit Breaker
 - a. The motor branch circuit breaker shall be rated for the line voltage of the motors and recommended for mounting and use inside an enclosure. The circuit breaker trip rating shall be sized for a minimum of 150% of the respective total connected motor and panel current. The circuit breaker shall have a standard magnetic trip and a minimum short circuit rating of 50kA.
- 26. Power Distribution Block
 - a. Distribution blocks shall be rated for line voltage and recommended for mounting and use inside an enclosure. The block shall be sized for a minimum of 150% of the respective total connected motor and panel current. They shall have a finger safe cover over the line, load lugs, and block.
- 27. Intrinsically Safe Barriers
 - a. Intrinsically safe interfaces shall be used on all field mounted components located in a hazardous location. The intrinsically safe devices shall be selected by the contractor based on the field devices conductor quantity, primary side voltage, and current requirements.

2.4 PLC SYSTEM

A. PLC Hardware

- 1. All PLC hardware shall be Allen Bradley CompactLogix or an approved equivalent.
- 2. PLC CPU: Allen Bradley CompactLogix with integral Ethernet Port.
- 3. PLC I/O: Provide CompactLogix Digital Input & Output, Analog Input & Output cards as required for the respective number and type of terminations. Include a minimum of 25% spare on each type of card.
- 4. Provide all required cables and pre-loaded development software and licenses for a complete and operational system.
- 5. Contractor shall program, test, and commission the PLC in accordance with these specifications.

B. Programming of PLC

- 1. The Contractor shall develop and execute all programming, functional testing and commissioning for the entire control system according to the descriptions in this specification and design drawing features and place the complete system into operation.

2. Adjustments or additional required sequence interlocks or alarming added during testing and commissioning shall be included in the bid price.
3. The Contractor shall provide all onsite field technicians to execute the startup and functional checkouts and performance testing of the complete control system.
4. PLC developed program files shall become the property of the Owner and shall be provided on a USB drive with full access rights.

C. PLC Programming Software

1. The PLC programming development software are provided solely by the Contractor for developing the software applications for the project.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install materials and equipment in a workman-like manner, utilizing craftsmen skilled in the respective trade. Provide work that has a neat and finished appearance.
- B. Conduit penetrations are not permitted through the top of any enclosures or equipment.

3.2 GENERAL

A. Grounding

1. The control panel enclosure, back panel, and front door shall be grounded to the incoming ground bus using #14 green stranded wire. All internal and field ground wiring shall be grounded to the ground terminals. The ground terminals shall be grounded to the incoming ground bus using #14 green stranded wire.

B. Floor Enclosure Mounting

1. Where the contractor determines the enclosure shall be floor-standing it shall be securely mounted to both the floor and wall/structure. Floor fasteners and anchors shall be stainless steel.
2. All wall fastening shall utilize galvanized or zinc-coated steel Unistrut, stainless steel fasteners, and stainless steel anchors where used.

C. Wall Enclosure Mounting

1. Where the enclosure is wall mounted, enclosure fastening shall utilize galvanized or zinc-coated steel Unistrut, stainless steel fasteners, and stainless steel anchors.

D. Enclosure Cutouts

1. All cutouts on enclosures and doors shall be made with a hydraulic die-type knockout tool. Knockout size for mounting components shall be in accordance with the component manufacturer's installation specifications. Knockouts for pushbuttons, pilot lights, and selector switches shall be 2.75-inch centers.

2. Top penetrations of the enclosures are not permitted.
3. All cutouts shall be free from burrs, rough edges, and damage. Incorrect cutouts compromising the NEMA rating of the enclosure or impairing proper solid mounting of the respective component will require the Contractor to replace the door or enclosure.

E. Wiring Identification

1. All control wires shall be identified at both ends with numbers shown on the design drawings using heat-shrinkable identification sleeves, computer-generated black lettering on white sleeve. Handwritten wire numbering will not be accepted.

F. Nameplate Identification

1. All devices and equipment mounted on the removable back-panel shall have identification adjacent to each device. All nameplates shall be located to provide an unobstructed view of the nameplate after wiring is complete. Do not mount nameplates on wireway covers.

G. Internal Panel Wire Routing

1. A.C. and D.C. wiring shall be kept separate as much as possible. All A.C. and D.C. control wires shall be terminated in terminal blocks. All shielded wire conductors shall be furnished before terminating with a slip-on crimp-style pin terminal with an insulated grip. If a method of distributing strain on wire bent frequently, such as those connected to devices on doors, is not employed, extra flexible hinge wire shall be used.

H. Terminal Blocks

1. Terminal Block Installation: Terminal blocks shall be sized to accept wires terminating thereon. All terminal blocks shall be identified with the wire number terminating thereon. All terminal blocks shall be of a color outlined in the products section. Terminal blocks shall be mounted on a high-rise mounting rail to permit easy installation and removal of wiring. Terminal blocks shall be provided with 15% spare terminals. Terminal blocks shall be furnished in the cabinet for all external connections. The side of terminals indicated for field connections shall be free of internal wire terminations. Provide end anchors at the end of a terminal section. Provide terminal block jumper bars/strips where common circuits are required on two or more terminal blocks.
2. Terminal Block Layout: Install and layout terminal blocks in common groups. Common groups are 120Vac, Neutral, Ground, 24Vdc, Inputs, Outputs. Input and Output groups shall be installed in addressing order.

I. PLC Input/Outputs and Wiring

1. All PLC digital inputs shall be 24Vdc unless otherwise specified
2. Relay output cards shall be used to control AC voltage devices, systems with a different source of power, and where electrical isolation is required.

3. 24Vdc outputs cards shall be used for 24Vdc devices not exceeding 75 % of the power ratings of the output channel.
4. All PLC digital/analog inputs and outputs shall be terminated. This includes all unused inputs and outputs. All input and output devices connected to the PLC shall be terminated on the appropriate colored terminal blocks. Input and output devices shall not be terminated directly on the PLC hardware terminals. Wiring to spare inputs and outputs shall bear the I/O number as the wire number. Direct wiring of panel components and field devices on the PLC cards is not permitted.

J. Circuit Isolation and Protection

1. Separate single-pole circuit breakers are required to isolate and protect each of the following:
 - a. PLC power supply
 - b. HMI (where specified)
 - c. 24Vdc Power Supply
 - d. Instrument Field Power
 - e. Panel Receptacle
 - f. Panel Heater (determine if needed)
 - g. Air Conditioner (determine if needed)
 - h. Enclosure Fans (determine if needed)
 - i. PLC Output Group
 - j. PLC Input Group
 - k. UPS Load Side Power
 - l. Communication/Network/Interface Equipment

K. Power Circuit Isolation and Protection

1. Separate circuit isolation and protection are required for each of the following:
 - a. Control Panel Main – Fused or CB Disconnect with either a Lockable Front Door Mounted Rotary Operator or Lockable Flange Mounted Operator
 - b. Motor Starters – Circuit Breakers with Adjustable Trip
 - c. Control Transformer Primary - CB or Fuses (where required)

3.3 CONTROL PANEL PLC PROGRAMMING

- A. The Contractor shall create the PLC program to include, but not be limited to, the following:
1. Logic, data, and descriptions not relevant or used (old code) shall be removed prior to SAT.
 2. Control sequences, interlocks, and alarms
 3. Network communications interface with Owner's SCADA
 4. Status, Alarm, and Event data for Owner's SCADA monitoring
 5. Setpoint and Control interface with Owner's SCADA
 6. The program shall be written in a fault-tolerant manner to prevent frequent operator intervention.

7. The program structure shall be divided into subroutines for each logical process and equipment group. Communication routines and data shall be in respective separate subroutines.
8. All analog data values shall be scaled in the program. The scaled value shall represent the real final value for Owner's HMI or SCADA systems.
9. Programs shall be written in ladder format. Programs shall be fully documented with rung and address comments. Comments at the start of new logic routines. Provide I/O listings, address, data usage, and configuration printouts. All data table words shall have descriptions.

B. Control System Operations:

The Contractor shall provide a complete safe, reliable operating control design that includes pump control, tank level instruments, logic and safety interlocks, status indication and monitoring as outlined.

1. Respective Fuel Transfer Pump HOA Selector Switch in HAND
 - a) Pump runs in HAND regardless of Day tank level switch status and the Main tank liquid level.
 - b) Pump run in HAND model is a hardwired start to the starter from the selector switch and interlocked by respective pump control circuit breaker and starter overload.
2. Respective Fuel Transfer Pump HOA Selector Switch in OFF
 - a) Pump will not operate in respective OFF mode.
 - b) Pump operation is hardwired interlocked by the OFF selector switch breaking control power to the motor starter coil.
3. Respective Fuel Transfer Pump HOA Selector Switch in AUTO
 - a) Pump runs in AUTO mode based on respective Day Tank Liquid Level switch/float and hardwired and program interlocks
 - b) Pump will START when:
 - The respective Day Tank Low Level switch/float activates indicating a low liquid level and a 2 sec program debounce timer has elapsed.
 - Once started set a program "pump started" Latch. The respective Day Tank Low Level switch/float low level state is not required to maintain pump run once this circuit is latched.
 - c) Pump will STOP when:
 - The respective Day Tank High Level switch/float activates indicating a high liquid level and a 2 sec program debounce timer

has elapsed.

- The “pump started” program latch is then unlatched.

d) Pump Run Interlocks:

- The “pump started” program latch is always unlatched when the respective pump selector switch is in the HAND or OFF positions.
- The “pump started” program latch is always unlatched when the respective motor fails to start or is overloaded.
- The main fuel tank liquid level goes below the minimum level setpoint. The setpoint is a value in the PLC and accessible from the Owner’s SCADA to modify the value.
- The respective Day Fuel Tank leak detection alarm. The pump can still be operated in Hand Mode.
- The Main Fuel Tank leak detection alarm. The pump can still be operated in Hand Mode.

4. Provide the following PLC data in a grouped data file for monitoring by the Owner’s SCADA system:
 - a. Main Fuel Tank Level
 - b. Main Fuel Tank Minimum Run Setpoint
 - c. Main Fuel Tank High Alarm Setpoint
 - d. Main Fuel Tank Low Alarm Setpoint
 - e. Fuel Transfer Pumps 1 & 2 Running Status
 - f. Fuel Transfer Pumps 1 & 2 Fault/OL Alarm
 - g. Fuel Transfer Pumps 1 & 2 Failed to Start Alarm
 - h. Fuel Transfer Pumps 1 & 2 Failed to Stop Alarm
 - i. Fuel Transfer Pumps HOA switch 1&2 in AUTO position
 - j. Fuel Transfer Pumps HOA switch 1&2 in OFF position
 - k. Fuel Transfer Pumps 1 & 2 Run Hours
 - l. Day Fuel Tanks 1 & 2 Low Level Switch/Float status
 - m. Day Fuel Tanks 1 & 2 High Level Switch/Float status
 - n. PLC Run/Fault Status
 - o. PLC Panel High Temperature
 - p. Main Fuel Tank Leak Detection
 - q. Day Fuel Tank #1 Leak Detection
 - r. Day Fuel Tank #2 Leak Detection

3.4 SAT EXECUTION

A. General

1. The Contractor shall deliver SAT test execution plans for the test prior to execution for review and approval of the Owner/Engineer. The SAT shall not be scheduled until the Owner/Engineer has approved the SAT test execution plans. Features and functions outlined below shall be outlined for execution in the SAT test document.
2. The SAT test execution plans shall be created in Excel in the sample format shown below, including the Test Name, Step, Procedure, Result, with respective entries for Pass, Fail, Initials, and Comments.

PUMP X START/STOP AUTO/MANUAL						
Test #		Test Steps	Pass	Fail	Witness Initials	Comments
1	Procedure	Change Pump X Mode to Manual Mode				
	Procedure	Press Pump X Start Button on HMI				
	Result	Verify Pump is Running				
	Result	Verify Pump indicates Running on the HMI				
	Result	Verify HMI Animations				
2	Procedure	Change Pump X Mode to Auto Mode				
	Procedure	Simulate or Create a Required Start Condition				
	Result	Verify Pump is Running				
	Result	Verify Pump indicates Running on the HMI				
	Result	Verify HMI Animations				

3. All control system functions, alarms, sequences, inputs/outputs, and operation possibilities shall be demonstrated. Where a function, sequence, or operation cannot naturally occur at the time of testing, it shall be simulated.
4. Modes of operation shall be modified through the operator devices such as pushbuttons and selector switches.

B. Test Failure Assessment

1. If the SAT test was stopped due to failures, the Contractor shall identify the failures, determine the causes of failures, repair failures, and deliver a written report to the Owner. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which the testing should be resumed. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the Owner. As a part of this test review meeting, the contractor shall demonstrate that the failure has been corrected. Based on the contractor's report and the test review meeting, Owner will determine the restart point and may require the test to be fully or partially rerun. The Contractor shall not commence any required re-testing until after receipt of written notification by Owner.

2. The contractor will not be held responsible for failures resulting from the following:
An outage of the main power supply in excess of the capability of any backup power source, provided that the automatic initiation of all backup sources was accomplished. Failure of existing equipment and existing instrumentation, provided that the failure was not due to contractor-furnished equipment, installation, or software.

END OF SECTION 330900

SECTION 6
SPECIFIC PROJECT REQUIREMENTS

SPECIFIC PROJECT REQUIREMENTS

1 - CONTACT DURING BIDDING

- 1.1 All questions during bidding should be addressed to Corey Zachel, P.E., at Verdantas LLC, 2001 Main Street, Suite 600 Wheeling, WV 26003, at czachel@verdantas.com

2 - INSURANCE

- 2.1 See the following Bid Set Sections for Insurance Requirements:
- A. Section 1, Instructions to Bidders, Part 10 Insurance
 - B. Section 3, General Conditions, Article 5 Bonds and Insurance (EJCDC) or Article 11 Insurance and Bonds (AIA), whichever is used in the Bid Set
 - C. Section 4, Supplemental Conditions

3 – BID OPENING MEETING – TEAMS ONLY

- 3.1 There will be a Non-Mandatory Pre Bid Conference on October 14, 2026 at 10:30 a.m. via a TEAMS only Meeting with walk-through digitally using TruView.

Microsoft Teams meeting Join:

<https://teams.microsoft.com/meet/241936208444297?p=7szY4U3TmdFoXGZjKm>

Meeting ID: 241 936 208 444 297

Passcode: 9Ng3FS9d

[Need help?](#) | [System reference](#)

Dial in by phone

[+1 872-212-4367,,410979022#](#) United States, Chicago

[Find a local number](#)

Phone conference ID: 410 979 022#

4 - TAXES

- 4.1 This project is sales-tax exempt, but there is a 2% B&O tax.
- 4.2 This project shall be Class Code 6611-6630. Refer to Business & Occupation Tax Return Form.
- 4.3 The Contractor shall pay the City Service Fee. Refer to City Service Fee Overview sheet.
- 4.4 Tax releases from both City and State must be received before the release of the final payment will be made.

5 - WORKING HOURS

- 5.1 No work shall be performed between the hours of 7:30 p.m. and 7:30 a.m. nor on Saturday, Sunday, or legal Holidays, without written permission of the Owner.

6 - PROJECT COMPLETION

- 6.1 All work including restoration and clean-up shall be completed no later than the contract completion date. Failure to complete all work within the allotted time will result in assessment of liquidated damages. Upon completion of all work and written notification of same by the Contractor, the Engineer and Owner will compile a punch list. The punch list will be sent to the Contractor. All punch list work shall be completed to the satisfaction of the Engineer and the Owner within 14 days after receipt of the punch list. Failure to complete the punch list work within the allotted time will result in assessment of liquidated damages.

7 - BUILDING & SITE ACCESS

- 7.1 Access to the building for field investigation of existing conditions must be scheduled in advance with the Owner by contacting Mr. Pete Wiggins, Chief of Maintenance, who can be reached at (304) 280-7870.

END OF SECTION

CITY OF WHEELING 1500 Chapline Street Room 115, Wheeling WV 26003-3553 / Phone (304) 234-3653
(QUARTERLY / ANNUAL) BUSINESS & OCCUPATION TAX RETURN

1500 Chapline Street Room 115, Wheeling WV 26003-3553 / Phone (304) 234-3653

CITY OF WHEELING 1500 Chapline Street Room 115, Wheeling WV 26003-3553 / Phone (304) 234-3653
(QUARTERLY / ANNUAL) BUSINESS & OCCUPATION TAX RETURN

- THE TAXPAYER LISTED BELOW IS REQUIRED TO FILE (even if no income is received during this tax period) AND TO PAY BUSINESS & OCCUPATION (B&O) TAXES DUE. TAXES ARE DUE WITHIN (30) DAYS AFTER TAX PERIOD ENDS.
- BUSINESS CLASSIFICATIONS AND TAX RATES ARE LISTED ON THE BACK SIDE OF THIS FORM FOR YOUR INFORMATION.
- PENALTY: TO BE CALCULATED AT 5% FOR THE 1ST MONTH PAST DUE OR FRACTION THEREOF, AND AN ADDITIONAL 1% FOR EACH SUCCEEDING MONTH OR FRACTION THEREOF.
- COMPLETE (PART 1) OF THE B&O TAX RETURN FORM FOR YOUR RECORDS.
- COMPLETE (PART 2) OF THE B&O TAX RETURN FORM, SIGN AND RETURN WITH YOUR PAYMENT.
- IF REPORTING UNDER "CONTRACTOR" and/or "RENTAL" - COMPLETE FORM ON REVERSE SIDE OF (PART 2).
- IF REPORTING TAX CREDIT - COMPLETE FORM ON REVERSE SIDE

MESSAGE:

CITY OF WHEELING BUSINESS & OCCUPATION TAX RETURN

1500 Chapline St Room 115, Wheeling WV 26003-3553 / Phone (304) 234-3653

(____ QTR ____ YEAR)

DATE BUSINESS BEGAN IN CITY: _____
DATE BUSINESS QUIT IN CITY: _____
IF BUSINESS SOLD, DATE OF SALE: _____
FURNISH NAME & ADDRESS OF NEW OWNER: _____

CLASS CODE	BUSINESS CLASSIFICATION	TAXABLE AMOUNT	RATE PER \$100	TAX DUE
		NET TAX DUE		
		TAX CREDITS (LIST ON BACK)	-	
		PENALTY ADD PENALTY OF 5% FOR FIRST MONTH OR FRACTION THEREOF AND 1% FOR EACH SUCCEEDING MONTH OR FRACTION THEREOF.	+	
		PAST DUE BALANCE	+	
		TOTAL AMOUNT DUE		
		TOTAL AMOUNT ENCLOSED		

(PART 1)  COMPLETE AND RETAIN UPPER PORTION FOR YOUR RECORDS.

(PART 2) **1** COMPLETE LOWER PORTION, SIGN AND RETURN WITH PAYMENT MADE PAYABLE TO "CITY OF WHEELING"

CITY OF WHEELING BUSINESS & OCCUPATION TAX RETURN

1500 Chapline St Room 115, Wheeling WV 26003-3553
Phone (304) 234-3653

(____ QTR _____ YEAR)

DATE BUSINESS BEGAN IN CITY: _____
DATE BUSINESS QUIT IN CITY: _____
IF BUSINESS SOLD, DATE OF SALE: _____
FURNISH NAME & ADDRESS OF NEW OWNER: _____

[illegible]

AUTHORIZED SIGNATURE

DATE _____

CLASS CODE	BUSINESS CLASSIFICATIONS	RATE PER \$100
1000	OTHER NATURAL RESOURCE PRODUCTS	1.00
2111-3999	MANUFACTURED PRODUCTS	.28
5212-5999	RETAILERS AND OTHERS	.365
5111-5199	WHOLESALERS	.15
*6611-6630	CONTRACTING BUSINESS * (List Specific Project/s in excess of \$5,000 Separately)	2.00
*6147-6151	RENTAL/LEASE INCOME PROPERTY FOR HIRE * (List all Rental Property Owned within City Limits)	.73
6211-6599	SERVICES AND ALL OTHER BUSINESS	.88
6111-6152	BANKING AND OTHER FINANCIAL INSTITUTIONS	.94
6600	SHARED SERVICES	.15

EXEMPTION TYPE	AMOUNT	EXEMPTION TYPE	AMOUNT

*IF REPORTING INCOME UNDER CLASS 6611-6630 (CONTRACTING BUSINESS) IT IS NECESSARY FOR YOU TO SEPARATELY LIST SPECIFIC PROJECT(S) IN EXCESS OF \$5000

PROJECT NAME (ADDRESS OR JOB SITE)

Completion date, if complete

Gross Amount

1) _____

\$ _____

2) _____

\$ _____

3) TOTAL OF ALL OTHER GROSS CONTRACTING INCOME RECEIVED (FOR JOBS LESS THAN \$5000)

\$ _____

TOTAL REVENUE THIS QUARTER FOR "CONTRACTING BUSINESS"

\$ _____

(CARRY TOTAL AMOUNT RECEIVED TO FRONT OF FORM UNDER "TAXABLE AMOUNT" COLUMN-CLASS 6611-6630

*IF REPORTING INCOME UNDER CLASS 6151 "RENTAL BUSINESS" IT IS NECESSARY FOR YOU TO UPDATE AND LIST ALL RENTAL PROPERTY YOU OWN WITHIN THE CITY LIMITS OF WHEELING (USE SEPARATE SHEET IF NECESSARY)

PROPERTY ADDRESS

OF UNITS

(Circle One)

GROSS RENT COLLECTED

1) _____

Commercial (or) Residential

\$) _____

2) _____

Commercial (or) Residential

\$) _____

3) _____

Commercial (or) Residential

\$) _____

4) _____

Commercial (or) Residential

\$) _____



CITY SERVICE FEE OVERVIEW

The City of Wheeling imposes a two dollar (\$2.00) per week City Service Fee ("CSF") upon all full-time employees, part-time employees, and self-employed individuals who regularly report to work at a physical location or work from home within the City of Wheeling. Employers are required to withhold \$2.00 per week from each employee's pay. Withheld fees are remitted quarterly to the City Finance Department. Self-employed individuals are responsible for remitting their own fees. CSF payments not received within one month following the end of the calendar quarter will be subject to penalties.

If you work multiple jobs in Wheeling, and the fee is being deducted by more than one employer, complete a *Prior Payment Form* (CSF-1). Fill out areas one (1) and two (2) and sign area three (3). Your primary employer must sign area four (4). Once the form is completed, it should then be given to your secondary employer(s) and retained by them. ***THE PRIOR PAYMENT FORM SHOULD NOT BE SENT TO THE CITY FINANCE DEPARTMENT.***

If the fee is withheld from your pay in error, complete a *Refund Claim Form* (CSF-4), attach a copy of your pay stub or other employer-provided documentation showing the fee was deducted in error, and return the form to the City Finance Department. This form must be received within thirty (30) days following the receipt of payment from your employer.

Businesses exempt from Wheeling Business & Occupation Tax, but that maintain offices / locations in Wheeling, are required to withhold the fee from employees.