OKLAHOMA MUNICIPAL POWER AUTHORITY

PONCA CITY GENERATING STATION

GSU1 REPLACEMENT CONSTRUCTION PROJECT

PONCA CITY, OKLAHOMA

Bid Opening: October 16th, 2017

Mandatory Pre-Bid Meeting: September 28th, 2017

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NOTICE TO BIDDERS

Oklahoma Municipal Power Authority
Ponca City Generating Station
GSU1 Replacement Project Construction
Ponca City, Oklahoma

NOTICE is hereby given that sealed Bids will be received by the Oklahoma Municipal Power Authority (Owner) at 2701 West I-35 Frontage Road, Edmond, Oklahoma 73013 until 3:00 p.m. Local Time, on October 16th, 2017 for furnishing the Work described in the Contract Documents. Bids will be opened and publicly read aloud at 2701 West I-35 Frontage Road, Edmond, Oklahoma. A mandatory pre-bid meeting will take place at OMPA Plant, located at 1420 North Union, Ponca City 74601 on September 28th, 2017 at 10:00 a.m. Any Bidder who does not attend this meeting will have its bid rejected by the Owner.

Ponca City Generating Station
GSU1 Replacement Construction Project

The Work to be done under this contract includes, but is not limited to, furnishing f.o.b. jobsite, complete in accordance with the plans and specifications, the following:

The construction of the GSU1 Replacement Project as outlined in the specifications provided by Owner's Engineer, Guernsey.

The Contractor shall furnish all labor, tools, equipment and insurance and all other items required for a complete installation of the materials required to complete the project.

Bids may be filed with Mr. Umesh Sadalge, Manager Generation Technical Services, Oklahoma Municipal Power Authority, 2701 West I-35 Frontage Road, Edmond, Oklahoma 73013, up to 3:00 p.m. of said day, at which time they will be opened and publicly read. Any bid received after the closing time will be returned unopened.

Bids received more than ninety-six (96) hours excluding Saturdays, Sundays and holidays before the time set for the opening of bids or bids received after bid deadline will be returned unopened.

Each bid must be accompanied by a certified check drawn on a solvent bank of the State of Oklahoma made payable to the Oklahoma Municipal Power Authority, in a sum equal to five percent (5%) of such bid, or at the option of the bidder, he may furnish a bid bond in lieu of the certified check, which bond shall be issued by a company authorized to do business in the State of Oklahoma. Each bid shall also be accompanied by Non-Collusion and Business Relationship Affidavits

No bid may be withdrawn for at least forty-five (45) days after the scheduled closing time for receipt of bids.

A complete set of bid documents regarding this project can be obtained from Umesh Sadalge, Senior Facilities Engineer, Oklahoma Municipal Power Authority, at 2701 West I-35 Frontage Road, Edmond, OK 73013, by telephone at (405) 359-2519, or by e-mail to usadalge@ompa.com .

The bonds required will be a Statutory Bond (See 61 O.S. §1), a Performance Bond, and a Maintenance Bond in the full amount of the contract (See 61. O.S. §113). Please see Part 2, General Conditions, Section 205.

All bids must be made on the bid forms furnished by the Owner and must be in accordance with the "Requirements for Bidding and Instructions to Bidders."

The Owner will require of every Bidder, before his bid is considered for award, that it submit the following qualification information.

a. Experience list for the past five (5) years, identifying the projects, location, address, contract amount, percent complete and any litigation, for work of the same character and magnitude performed.
b. Three references complete with names, address, and phone numbers, for the three most recent projects.
c. Business and technical organization.
d. Financial resources available and to be used in performing the contemplated work.
e. Non-Collusion Affidavit
f. Business Relationship Affidavit
g. A bid bond in the amount of five percent (5%) of the bid shall accompany each bid. (See 61 O.S. §107(A)(1)).

Each bidder shall have such information, together with a recent financial statement, attached to its bid when received.

The Owner reserves the right to evaluate bids and reject any and all bids.

Oklahoma Municipal Power Authority

_____
Dave Osburn, General Manager

_____
Ass't Secretary (SEAL)

PART 1 - PROCEDURES AND LEGAL

SECTION 102 - INSTRUCTIONS TO BIDDERS

102.01 DEFINITIONS

Words used in the Contract Documents shall be as defined in the General Conditions and the Special Conditions.

102.02 EXAMINATION OF DOCUMENTS AND SITE

a. Each bidder shall thoroughly examine and be familiar with the Contract Documents. Submission of a Bid shall constitute an acknowledgment upon which the Owner may rely that the Bidder has thoroughly examined and is familiar with each of the Contract Documents. The failure or neglect of a Bidder to receive or examine any Contract Document or any part thereof shall in no way relieve it from any obligations with respect to its Bid or to the Contract. No claim for additional compensation shall be allowed which is based upon a lack of knowledge of any Contract Document. Each prospective Bidder must attend a mandatory pre-bid meeting on September 29th, 2017, 10 a.m. at the Ponca City Generating Station, 1420 North Union, Ponca City, Oklahoma 74601.

b. Each Bidder shall thoroughly examine and be familiar with the Project site and its improvements. Submission of a Bid shall constitute an acknowledgment upon which the Owner may rely that the Bidder has thoroughly examined and is familiar with the Project site and its improvements; both as to surface and subsurface conditions, and that it waives any claim for any discrepancy between the site and its improvements and the Contract Documents. The failure or neglect of a Bidder to fully familiarize itself with the Project site shall in no way relieve it from any obligations with respect to its Bid or to the Contract. No claim for additional compensation will be allowed which is based upon lack of knowledge of the Project site and its improvements.

102.03 INTERPRETATIONS

No oral interpretations will be made to any Bidder as to the meaning of any of the Contract Documents. Every request for interpretation shall be made in writing and delivered to the owner 10 days or more before the time last announced for opening Bids. Every interpretation made to Bidders shall be in the form of an Addendum which, if issued, will be sent by email as promptly as is practicable to all parties to whom the Contract Documents have been issued. All such Addenda shall become part of the Contract Documents.

102.04 FORM OF BID

The Owner's original of each Bidder's Bid shall be submitted upon the Bid form found in Section 103 bound in a complete set of the Contract Documents. No copies or loose sheets shall be submitted. Each Bid shall give the amount bid in figures and, when required, in words. Each Bidder shall submit three original bound Bids enclosed in a sealed envelope marked "BID" with the full name of the Project and the number of the Contract being bid as shown on the cover of the Contract Documents, the date and time for opening, the name and return address of the Bidder, and shall be addressed to the Owner at the location last announced for receipt of Bids.

102.05 COMPLETENESS OF BID

a. Each Bidder shall quote on all items in the Proposal form for items which may be basic units of construction, integrated units of construction, alternative prices, additive prices, deductive prices, or a combination thereof, except for optional items on which no bid is intended. Failure to do so may result in the Proposal being rejected as not responsive.

b. When quotations on certain items are optional, Bidders shall insert the words "no bid" in the space provided for any items for which no offer is made.

c. Each Bid shall include specific acknowledgment of receipt of all Addenda issued during the bidding period. Failure to do so may result in the Bid being rejected as not responsive.

d. Each Bidder shall furnish such supplemental information relating to its experience, personnel, equipment and business as is required by the Bid form. Failure to do so may result in the Bid being rejected as not responsive.

e. Additional technical data furnished by a Bidder, but not required by the Contract Documents, may at the Owner's option be considered a part of the Bid to the extent that it is supplementary to, is consistent with and not contrary to the Contract Documents.

102.06 ALTERATIONS IN BID

Except as otherwise provided herein, Bids which are conditional in any way, or which contain erasures or interlineations not authenticated as provided herein, or which contain items not called for, items not in conformity with applicable laws, changes, additions, recapitulations, or any other modifications of the Bid form which are not specifically called for in the Contract Documents, may be rejected at the option of the Owner as not responsive. Erasures, interlineations or other corrections shall be authenticated by affixing in the margin immediately opposite the correction, the handwritten initials of each person executing the bid.

102.07 MORE THAN ONE BID

If, in addition to its BID, a Bidder has the controlling interest in a Bidder offering another Bid, all Bids by such Bidders may be rejected; provided, however, that a subcontractor who has quoted prices to a Bidder for construction which constitutes less than 1/2 of the amount of such Bidder's Bid is not thereby disqualified from quoting prices to other Bidders for portions of the Work or from submitting a Bid to the Owner for the Work to be furnished under the Contract.

102.08 EXECUTION OF BID

If a bid is made by a partnership, it shall contain the name and address of each partner and shall be executed in the partnership name, followed by the handwritten signature of a partner authorized to execute the Bid for the partnership. If a Bid is made by a corporation, it shall be executed in the name of the corporation, followed by the handwritten signature of an officer authorized to execute the Bid for the corporation, and the printed or typewritten designation of the office he holds in the corporation. Another partner of the partnership or official of the corporation shall attest to the authority of the person executing the Bid. The Owner may require any Bidder to furnish certified copies of extracts of the minutes of meetings of the governing body of the Bidder authorizing execution of the Bid and Contract Documents.

102.09 SUBMISSION OF PROPOSAL

It is the sole responsibility of each Bidder to deliver its Bid to the Owner at the place for receiving Bids and prior to the time for opening Bids last announced to Bidders. Any Bid received after the time last announced for opening Bids will be returned to the Bidder unopened.

102.10 MODIFICATION OF BID

A modification of a Bid already received will be considered only if the modification is received prior to the time last announced for opening Bids. All modifications shall be made in writing, executed and submitted in the same form and manner as the original Bid. Telephonic, faxed, or electronic modifications will not be considered.

102.11 WITHDRAWAL OF BID

Each Bid shall constitute an offer to the Owner as outlined therein and shall be irrevocable after the time last announced for opening Bids. After the time last announced for opening Bids and until execution of the Contract, no Bidder will be permitted to withdraw its Bid, unless such execution is delayed due to acts of the Owner, for a period not exceeding 45 days after the time last announced for opening Bids.

102.12 POSTPONEMENT OF OPENING

The Owner reserves the right to postpone the date and time last announced for opening Bids and such postponements may be made at any time prior to the time last announced for opening Bids. The Owner will give written, faxed, or electronic notice of any such postponement to each party to whom Contract Documents have been issued, followed by issuance of an Addendum confirming the changing of the announced date and time for opening Bids.

102.13 OPENING BIDS

At the time and place last announced for opening Bids, each Proposal which has been received prior to the time last announced for opening Bids, except those which have been properly withdrawn, will be publicly opened and read aloud, irrespective of any irregularities or informalities in such Bids. Each Bidder may have no more than two representatives at the opening.

102.14 PRICES

a. The bid prices shall include everything necessary for furnishing the Work and fulfilling the Contract, except as may be otherwise expressly provided in the Contract Documents.

b. Prices in words shall be valid only in a Bid Schedule requiring a single lump sum bid for all construction in the Schedule. If there is a difference between the price bid in words and the price bid in figures for the same lump sum bid, the words shall be the amount bid.

c. If the sum of the correct extended amounts bid does not equal the total amount shown in the Bid for the Bid Schedule, the correct sum of the correct extended amounts bid shall be the total amount bid for all construction in the Bid Schedule.

d. If a Bidder submits more than one copy of its Bid and all copies of the Bid are not identical in all respects, the errors, if any, in extended amounts shall be first corrected as described above. If the several copies of the Bid submitted are not identical after being so corrected, the copy having the lowest total amount bid for all Work in the schedule shall be the Bidder's Bid and all other copies shall be invalid.

e. All prices bid shall be firm unless the Special Conditions permit price escalation. If all or part of a Bid includes construction for which the Special Conditions permit price escalation and no escalation method or indices are specified, the Bidder shall indicate in its bid the specific items subject to escalation, and shall give the method and indices to be used in computing the amount thereof.

f. It is recognized that the Contractor's time and expense for completing each type of Basic Unit of Construction may vary from one part of the construction to another. The Bidder's attention is called to the fact that only

one Unit Price is bid in the Bid for each type of Basic Unit of Construction and further that, except as otherwise provided in the Special Conditions, the Owner may change the quantity of each type of Basic Unit of Construction without any change in the Unit Price bid.

102.15 EVALUATION OF BIDS

In evaluating the Bids, the Owner may consider the recommendation of the Owner's Engineer, Guernsey, the bid prices, escalation, time of completion, Bidder's experience, past record of the Bidder in meeting commitments, qualifications of Bidder's personnel, Bidder's equipment available for prosecution of the Contract, character and proximity to the Project of Bidder's service facilities, effect upon the total cost to the Owner of ownership and operation of the Project and any other factors that may determine which Bid best serves the interests of the Owner. If the Bid includes furnishing manufactured equipment, the Owner will consider in addition to the foregoing the design and construction of such equipment, its performance, the cost of operation and maintenance, the availability of Shop Drawings, and, where applicable, the character and location of the Supplier's service facilities. The Owner reserves the right to waive irregularities or informalities in any or all Bids without cause.

102.16 REJECTION OF BIDS

The Owner reserves the right to reject any or all Bids without cause. Without limiting the generality of the foregoing, the Owner may reject any Bid which is incomplete, non responsive, obscure or irregular, any Bid which omits a bid on any one or more items for which bids are required, and any Bid from a Bidder which has previously failed to perform satisfactorily or to complete on time construction of any nature.

102.17 ACTION ON BID

a. Within 45 days after the time last announced for opening Bids, the Owner may act either to issue a Notice to Apparent Low Bidder or to reject all Bids. Failure of the Owner to issue a Notice to Apparent Low Bidder within the said time, or such additional time as the apparent lowest responsive Bidder shall agree to extend its Proposal shall constitute rejection of all Bids.

b. The Notice to Apparent Low Bidder will be signed by a duly authorized Official of the Owner and delivered to the Bidder in the manner provided for written notices. No other action or notice shall constitute a Notice to Apparent Low Bidder. Delivery of a Notice to Apparent Low Bidder shall obligate the Bidder who receives such notice to furnish Performance, Maintenance, and Statutory Bonds, Insurance Certificate or Insurance Policies, and to execute the Contract.

102.18 BONDS AND INSURANCE

a. Within 10 days after delivery of Notice of Apparent Low Bidder, or such additional time as is allowed by the Owner, the Bidder shall furnish

satisfactory Performance, Maintenance, and Statutory Bonds, Insurance Certificate or Insurance Policies, and shall execute the Contract. Failure, neglect or refusal by the Bidder to do so shall constitute a breach of agreement to furnish the required documents and to enter into the Contract.

b. Any Bidder receiving a Notice to Apparent Low Bidder who fails, neglects or refuses to furnish Performance, Maintenance, and Statutory Bonds, Insurance Certificate or Insurance Policies, and execute the Contract as herein provided shall not be the lowest responsive Bidder. The Owner may then select the lowest responsive Bidder and deliver a Notice to Apparent Low Bidder to such lowest responsive Bidder.

102.19 CONSTRUCTION SCHEDULE

a. Each Bidder shall base its Bid upon the Construction Schedule, if any, included in the Contract Documents. With its Bid, the Bidder may include an alternative Construction Schedule for consideration by the Owner in lieu of the Construction Schedule included in the Contract Documents; provided, however, such alternative Construction Schedule shall provide for the completion of each part of the Work within the Construction Time or Construction Times set forth in the Contract Documents.

b. If no Construction Schedule is included in the Contract Documents, the Bidder entering into a Contract with the Owner shall furnish a Construction Schedule satisfactory to the Owner prior to submittal of the first Contractor's Request for Payment or 30 days after Notice to Proceed, whichever is earlier.

102.20 SPECIAL INSTRUCTIONS

All bidders shall comply with such Special Instructions to Bidders as are provided in the Special Conditions.

102.21 SUBCONTRACTS

Each Bidder shall list on the Bid form the name of each construction Subcontractor who will furnish in excess of ten percent of the Work. Failure to do so shall entitle the Owner, at its option, to reject the Bid and award the Contract to the lowest responsive Bidder furnishing a satisfactory list of Subcontractors.

PART 1 – PROCEDURES AND LEGAL

SECTION 103 – BONDS

BID BOND

That _____ Bidder, as Principal and _____ (Bonding Company), as Surety, a corporation of _____ whose principal office is located at _____ are firmly bound unto the Oklahoma Municipal Power Authority (Owner), as Obligee, to fulfill the obligations of the Principal and the Surety under the Bid to which reference is hereafter made, in the amount of _____ Dollars ($ _____) for payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written Bid, dated _____ offered to enter a contract with Obligee for the Oklahoma Municipal Power Authority Ponca City Generating Station GSU1 Replacement Project Construction pursuant to the terms and conditions set forth in the Contract Documents, dated _____, including all Addenda thereto, the engineering provisions of which were prepared by the Engineer and Owner, which Bid and Contract Documents are by this reference made a part thereof.

NOW, THEREFORE, the condition of this obligation is such that is the Principal within 10 days, or such additional time allowed by the Obligee, after delivery by the Obligee to Principal of Notice to Apparent Low Bidder shall furnish Performance Bond, Maintenance Bond, Statutory bonds, Insurance Certificate or Insurance Policies, and execute the Contract all as specified in said Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Any suit under this bond shall be instituted before the expiration of two (2) years from the date announced for opening Bids.

Signed and sealed the _____ day of _____, 20___.

_____	_____
(Surety)	(Principal)
_____	_____
(Title)	(Title)

MAINTENANCE BOND

DEFECT BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____,
As Principal, and _____,
a corporation organized under the laws of the State of _____, and authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound unto The Oklahoma Municipal Power Authority in the penal sum of _____
Dollars ($ _____), in lawful money of the United States of America, said sum being equal to One Hundred Percent (100%) of the Total Contract Amount, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written contract with The Oklahoma Municipal Power Authority, dated _____, 20___, for the Oklahoma Municipal Power Authority Ponca City Generating Station GSU1 Replacement Project Construction all in compliance with the plans and specifications therefore, made a part of said Contract and on file in the Office of The Oklahoma Municipal Power Authority.

NOW, THEREFORE, if said Principal shall pay or cause to be paid to The Oklahoma Municipal Power Authority, all damage, loss, and expense which may result by reason of defective materials and/or workmanship in connection with said work, occurring within the warranty period, then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect of releasing the Sureties, or any of them, from the obligations of this bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in fact, duly authorized so to do the day and year set forth below.

Dated this _____ day of _____, 20 ____.

PRINCIPAL

_____

By _____

_____
Title

ATTEST:

_____

SURETY:

_____

By: _____

Name: _____
Attorney-in-Fact

Address: _____

City: _____

Telephone: _____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENT, that we, _____ _____, as Principal and, _____with general offices in _____ a corporation organized under the laws of the State of _____ and authorized to transact business in the State of Oklahoma, Surety, are held and firmly bound unto The Oklahoma Municipal Power Authority a body corporate and politic organized and existing under the laws of the State of Oklahoma, in the penal sum of _____ _____ Dollars ($ _____), lawful money of the United States, in payment of which sum well and truly to be made, the said Principal and Surety bind presents.

Signed, sealed and delivered this _____ day of _____, 20 _____.

WHEREAS, said Principal has entered into a written contract with the Oklahoma Municipal Power Authority of the State of Oklahoma dated this ____ day of _____, 20___, Oklahoma Municipal Power Authority Ponca City Generating Station GSU1 Replacement Project Construction according to the plans and specifications attached to said contract, which includes the furnishing of all necessary tools, equipment, material and labor, a copy of which contract, together with all plans, specifications, and general conditions, is hereto attached and made a part hereof as if set out in full herein, and for the payment to the Oklahoma Municipal Power Authority, of all sums due, or which may become due, by the terms of the contract, as well as by reason of any violation thereof by the Principal herein, and for the payment of any and all judgments, costs of suits and actions brought against the Oklahoma Municipal Power Authority, or its officers, for any cause whatever arising from, or on account of, any injuries or damage to life or property, suffered or sustained by any person, or persons, firm or corporation, caused by the Principal herein, its agents, servants, or employees, in the construction of said work, or by, or in consequence of, any negligence, carelessness, or misconduct, in guarding or protecting the same, or from any improper or defective materials used in the construction of said work, or any act of omission of said Principal, or its agents, servants, or employees; and for the protection of the Oklahoma Municipal Power Authority against all suits, or clams for infringements, or patent rights or processes.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

NOW THEREFORE, the condition of the foregoing obligation is such that is the said Principal shall well and truly perform all the covenants and conditions of the said contract on the part of the said Principal to be performed, then this obligation shall be void, otherwise to remain in full force and effect in law.

IN TESTIMONY WHEREOF, the said Principal has caused these presents to be executed in its name, and its corporate seal to be hereto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name, and its corporate seal to be hereunto affixed, by its attorney-in-fact, duly authorized thereunto so to do, the day and year first above written, and these presents have been executed in duplicate counterparts.

_____

_____

_____
Contractor (Principal)

_____ _____
Oklahoma Resident Agent

_____ _____
By

_____ _____
Address Surety Company

_____

By_____
Attorney-in-Fact

(Accompany this bond with Attorney-in-Fact's Authority from the Company)

(Principal's Seal) (Surety's Seal)

It is understood that if we desire to attach our own printed purchase agreement form to the Bidding Documents that no intent or purport of such printed form shall be in conflict or be at variance with any part of these Bidding Documents except as specifically outlined in a letter accompanying this Bid listing all exceptions to these Bidding Documents.

If written notice of the acceptance of this Bid is mailed, electronically mailed or delivered to the undersigned within forty-five (45) days after the date of opening bids, or any time thereafter before this bid is withdrawn, the undersigned will, within ten (10) days after the date of such mailing, electronic mailing or delivering such notice, execute and deliver a Contract in the form of contract attached.

The undersigned hereby designates as his office to which such notice of acceptance may be mailed, electronically mailed or delivered.

_____

_____

SIGNATURE OF BIDDER

_____

By _____

Title _____

Address _____

_____

Dated _____

ATTEST:

_____

Title _____

(Attach Corporate Seal)

STATUTORY BOND

KNOW ALL MEN BY THESE PRESENT:

that _____, as Principal, and _____(Bonding Company), as Surety, a corporation of _____, whose principal office is located at _____, are firmly bound unto the Oklahoma Municipal Power Authority (Owner), as Obligee to fill the obligations of the Principal and the surety under the Contract to which reference is hereafter made, in the amount of_____ Dollars ($_____) for payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, Principal has by written Bid, dated _____, offered to enter into a Contract with Obligee for the Oklahoma Municipal Power Authority Ponca City Generating Station GSU1 Replacement Project Construction pursuant to the terms and conditions set forth in the Contract Documents, dated _____, the Owner has issued a written Notice to Apparent Low Bidder dated _____, and

WHEREAS, this bond is given in compliance with Title 61, Oklahoma Statutes, Sections 1, and 2, as amended and supplemented,

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall pay all indebtedness incurred for labor or material or rental of machinery or equipment furnished in the construction of said public building or in making said public improvement, and shall faithfully perform all provisions of the Contract on its part, and maintain the Obligee and the Obligee's property free and clear of all liens arising out of agreements for labor and material and pay all laborers, mechanics, and subcontractors and materialmen, and all persons who shall supply such person or persons or subcontractors or material men with provisions and supplies for the carrying on of such work and indemnify and save harmless the Obligee from all loss, cost or damage which it may suffer by reason of the failure to do any of the foregoing, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

All persons who have furnished labor, materials or supplies for use in and about the work provided for in the Contract shall have a direct right of action under this bond, subject to the Obligee's priority.

Any suit under this bond shall be instituted before the expiration of seven (7) years from the date on which final payment under the Contract is due.

Signed and sealed this _____ day of _____, 20 _____.

_____	_____
Surety	(Principal)
	By _____
	_____
	(Title)

_____
Attorney-in-Fact

BID AFFIDAVITS

The following affidavits are to accompany the bid:

A. Non-Collusion Affidavit

STATE OF _____)
) SS
COUNTY OF _____)

_____**,** of lawful age, being first duly sworn, on oath says that (s) he is the agent authorized by the Bidder to submit the attached bid. Affiant further states that the Bidder has not been a party to any collusion among Bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any Oklahoma Municipal Power Authority official or employee as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussion between Bidders and any Oklahoma Municipal Power Authority official concerning exchange of money or other thing of value for special consideration in the letting of a contract.

_____

Subscribed and sworn to before me this _____ day of _____, 20 _____.

_____
Notary Public

My Commission Expires:

_____

B. Business Relationships Affidavit

STATE OF _____)
) SS
COUNTY OF _____)

_____, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the Bidder to submit the attached bid. Affiant further states that the name of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the architect, engineer, or other party to the project is as follows:

_____

_____

_____

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company and any officer or director of the architectural or engineering firm or other party to the project is as follows:

_____

_____

_____

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

_____

_____

_____

(If none of the business relationships hereinabove mentioned exist, affiant should so state.)

_____

Subscribed and sworn to before me this_____ day of _____, 20 _____.

_____
Notary Public

My Commission Expires:

_____

BID

Oklahoma Municipal Power Authority

Ponca City Generating Station
GSU1 Replacement Project Construction
Ponca City, Oklahoma

Oklahoma Municipal Power Authority
Edmond, Oklahoma

Ladies and Gentleman:

Having carefully examined the Plans and Specifications for the Ponca City Generating Station GSU1 Replacement Project Construction for the Oklahoma Municipal Power Authority, being fully familiar with the site of the proposed work and having familiarized ourselves with all the factors affecting the cost of construction, we propose to furnish all the necessary labor, materials, tools and equipment, together with all other items of cost including insurance and supervision required for the work called for on the Plans and in the Specifications for the following:

A. GSU1 REPLACEMENT CONSTRUCTION PROJECT as specified herein.

Base Bid (See Bid Bid Sheet Sheets-1-6, Pages Spec-19-24).

TOTAL BID PRICE: _____

_____Dollars ($ _____)

B. Completion Date: _____

(Required Completion Prior to March 31, 2018)

ADDENDUM RECEIPT

We acknowledge receipt of the following Addenda:

Addendum No. _____ Dated_____

Addendum No. _____ Dated_____

Addendum No. _____ Dated_____

PART 1 - PROCEDURES AND LEGAL

SECTION 104 - AGREEMENT

THIS CONTRACT is made and entered into by and between the Owner and the Contractor whose names are subscribed hereto, and is effective as of the date the Contract is signed by the Owner.

WITNESSETH:

WHEREAS, The Owner has caused the preparation of certain contract documents entitled Ponca City Generating Station Request for Bid Technical Specification for GSU1 Replacement Project Construction and

WHEREAS, The Owner has invited Bids, received and analyzed said Bids and duly given Notice to Apparent Low Bidder as set forth in detail in the Contract Documents, which are defined in Part 2 - General Conditions, all of which Contract Documents are made a part hereof and which constitute the whole Contract between the Owner and the Contractor, and

WHEREAS, The Contractor has offered in its Bid to engineer, procure and construct as required by the Contract Documents in its Bid.

NOW, THEREFORE, It is hereby agreed that

(a) The Contractor shall furnish the Work, pay all costs and perform all requirements of this Contract for the GSU1 Replacement Project Construction in the manner specified in the Contract Documents, and

(b) The Owner shall pay to the Contractor the Total Contract Amount of _____ Dollars ($_____), in accordance with Part 2, General Conditions, Section 207.

(c) It is further agreed that the Contractor shall start work within 30 days after delivery of the Owner's Notice to Proceed and shall complete the work in accordance with the Construction Schedule or within the Construction Time or Construction Times set forth in the Special Conditions or the Bid, whichever is earlier.

IN WITNESS WHEREOF, two (2) identical counterparts of this contract, each of which shall for all purposes be deemed an original hereof, have been duly executed by the parties hereto.

CONTRACT DOCUMENTS
REVIEWED AS TO FORM:

_____
Attorney for Owner

Oklahoma Municipal Power Authority
2701 West I-35 Frontage Road
Edmond, Oklahoma 73013

The undersigned hereby certifies
and represents to the Contractor
that the person signing this
Contract on behalf of the Owner
is authorized to do so.

By_____
DAVE OSBURN
GENERAL MANAGER

By _____

Title _____ Date _____
Official of Owner

The undersigned hereby certifies
and represents to the Owner that
_____
the person signing this Contract
on behalf of the Contractor is
authorized to do so.

Contractor

By _____

By _____

Title _____

Title _____

Date_____

PART 2 - GENERAL CONDITIONS

SECTION 201 – DEFINITIONS

201.01 ACT OF GOD

"Act of God" shall mean an earthquake, flood, cyclone or other cataclysmic phenomenon of nature. A rain, windstorm, high water or other natural phenomenon of unusual intensity for a specific locality, but which might reasonably have been anticipated from historical records of the general locality, shall not be construed as an Act of God.

201.02 ADDENDA

"Addenda" shall mean written modifications of the Contract Documents which may be issued by the Owner to holders of Contract Documents prior to opening Bids.

201.03 BIDDER

"Bidder" shall mean any person, partnership or corporation that submits a Bid and Bid Guaranty, if required, to the Owner.

201.04 BID SCHEDULE

"Bid Schedule" shall mean an itemized list of bid items and proposed Contract Amount for the part of the Work specified in the Contract Documents which the Owner may let either alone or together with other Bid Schedules as a single Contract.

201.05 CHANGE ORDER

"Change Order" shall mean a written supplemental agreement executed by the Owner and the Contractor to modify the Contract at the time of or after its execution.

201.06 COMPLETION

"Completion" shall mean completion of the Work by the Contractor and written Notice of Acceptance of Construction to the Contractor by the Owner's official.

201.07 CONSTRUCTION SCHEDULE

"Construction Schedule" shall mean the time and activities plan for completion of the Work prepared in the format required by the Contract Documents.

201.08 CONSTRUCTION TIME

"Construction Time" or Construction Times" shall mean the number of days following delivery of Notice to Proceed as set forth in the Contract Documents for completion of the Work and any specified portions thereof.

201.09 CONTRACT

"Contract" shall mean the whole understanding between the Owner and the Contractor covering the furnishing of the Work and payment thereof which is encompassed within the Bid Schedule or Schedules specified in the Agreement and described in the Contract Documents.

201.10 CONTRACTOR

"Contractor" shall mean the person, partnership or corporation to whom a Notice to Apparent Low Bidder has been issued by the Owner and who has furnished suitable Performance and Labor and Material Payment Bonds, Insurance Certificate or Insurance Policies, Lump Sum Bid Breakdown and has executed the Contract.

201.11 CONTRACT DOCUMENTS

"Contract Documents" shall mean the following documents which form the Contract:

a. Notice to Bidders
b. Instructions to Bidders
c. Bid
d. Construction Schedule (If used)
e. Performance and Labor and Material Payment Bonds
f. Agreement
g. General Conditions
h. Special Conditions
i. Engineering Specifications
j. Contract Drawings
k. Addenda
l. Change Orders

201.12 CONTRACT DRAWING

"Contract Drawing" shall mean a diagrammatic or pictorial description of the Work to be furnished, or copies thereof, which is included as a part of the Contract Documents as modified by Addenda and Change Orders to the Contract. Contract Drawings shall include bid drawings issued to Bidders to delineate the scope of the Work and construction drawings issued to the Contractor during construction to further describe the details of the Project design.

201.13 ENGINEERING SPECIFICATIONS

"Engineering Specifications" shall mean written descriptions, including performance, of the Work to be furnished which is a part of the Contract Documents.

201.14 FIELD ENGINEERING REPRESENTATIVE

"Field Engineering Representative" shall mean an agent or employee of the Owner located at the Project site or at the point of manufacture of equipment.

201.15 OFFICIAL

"Official" shall mean a partner, officer or employee of an organization, properly authorized by the governing body to execute commitments for the organization, while acting within the limits of authority granted to him.

201.16 OWNER

"Owner" shall mean the person, partnership, corporation or governmental organization for which the Work is to be furnished.

201.17 OWNER'S ENGINEER

"Owner's Engineer" shall mean Guernsey.

201.18 OWNER'S INSTRUCTION

"Owner's Instruction" shall mean a written interpretation of the Contract issued for the guidance of the Contractor by the Field Engineering Representative on behalf of the Owner when specifically designated in the Special Conditions.

201.19 PERFORMANCE AND LABOR AND MATERIAL PAYMENT BONDS

"Performance Bond" and "Labor and Material Payment Bond" shall mean the forms of Performance Bond and Labor and Materials Payment Bond included in the Contract Documents which shall be furnished by the Contractor and its Surety as assurance to the Owner that the Contractor will furnish, pay for and warrant the construction and perform all the requirements of the Contract.

201.20 PROJECT

"Project" shall mean the improvement or facility to be completed in whole or in part through the performance of the Contract.

"Project Construction Manager" shall mean the partner, officer, agent or employee of the general construction contractor designated to represent such Contractor from time to time to manage and to coordinate the labor, material and equipment installation for the Project.

201.21 PROJECT MANAGER

"Project Manager" shall mean the official, agent or employee of the Owner designated by the Owner from time to time to act for the Owner in all matters pertaining to the Project.

201.22 BID

"Bid" shall mean a Bidder's offer to the Owner to contract for and undertake furnishing the Work for one or more Bid Schedules.

201.23 RETAINED AMOUNT

"Retained Amount" shall mean monies earned by the Contractor and temporarily withheld by the Owner in accordance with provisions of the Contract Documents. The Retained Amount for this Contract will be as indicated in Section 207.01.

201.24 REVIEW

"Review" shall mean the general observation of construction from time to time by Owner as to the performance of the Contractor in meeting the requirements of the Contract.

201.25 SHOP DRAWING

"Shop Drawing" shall mean a diagrammatic, pictorial or written description of the details of proposed materials, equipment components, construction, installation instructions, and operation and maintenance data, except drawings containing proprietary information, prepared by or for the Contractor and submitted for the review of the Owner to demonstrate that the construction when completed will meet the requirements of the Contract.

201.26 SUBCONTRACTOR

"Subcontractor" shall mean an independent person, partnership or corporation, other than an employee of the Contractor, supplying under agreement with the Contractor or any Subcontractor of the Contractor any construction or equipment in connection with the Contract.

201.27 SUBSTANTIAL COMPLETION

"Substantial Completion" shall mean that degree of completion of the construction necessary for the Project to function in commercial operation at its intended location for its intended use.

201.28 SUPERINTENDENCE

"Superintendence" shall mean the detailed direction by the Contractor necessary to furnish the Work required under the Contract, whether at the Project site or at other locations.

201.29 SUPPLY CONTRACTOR

"Supply Contractor" shall mean an independent person, partnership or corporation which furnishes any materials or equipment directly to the Owner under another contract or in connection with the Project.

201.30 SURETY

"Surety" shall mean a corporation executing a Performance Bond or Labor and Material Payment Bond payable to the Owner.

201.31 UNITS OF CONSTRUCTION

a. "Basic Unit of Construction" shall mean an elementary part of the total construction which includes like materials and labor, is repetitive in nature, and is readily and economically measurable, i.e., "cu. yd. of concrete in place", "lin. ft. of pipe installed", or "lb. of reinforcing steel furnished".

b. "Integrated Unit of Construction" shall mean a part of the total construction which combines various quantities of unlike materials, equipment and labor into a separate piece of construction where the component materials, equipment and labor are not in themselves readily and economically measurable, i.e., "Pumping station complete", includes pumps, excavation, concrete, electrical work, backfill, etc.

201.32 WORK

a. "Work" shall mean all management, Superintendence, Contractor's design and detailing, checking, labor, materials, use of equipment and tools, transportation and other facilities or services necessary to complete any and all portions of the Contract.

b. If the Contract includes furnishing manufactured equipment, "Work" shall also include all management, Superintendence, labor, materials, equipment components, tools, inspection, testing, transportation and other facilities and services necessary to design, manufacture, fabricate, assemble, deliver and install equipment and complete the Contract.

201.33 WRITTEN NOTICE

"Written Notice" shall mean a handwritten or typewritten communication delivered in person, or sent prepaid by Express Mail, Registered or Certified United States Mail, to

the individual, or to a partner of the partnership, or to an Officer of the corporation which is the Owner or the Contractor, or to the proper executive official if the Owner is a governmental body, to the business address of the party to be served as shown in the Contract Documents.

PART 2 - GENERAL CONDITIONS

SECTION 202 - OWNER-CONTRACTOR

202.01 OBSERVATION AND REVIEW

a. The Owner and/or its representatives may observe and review any portion of the Work at any reasonable time during construction. The Owner may witness the testing of any portion of the Work wherever it may be located. However, the Owner will not be required to provide exhaustive or continuous on-site observation of all details of construction.

b. One or more Field Engineering Representatives may be assigned to the Project site or may visit the Contractor's facilities to keep the Owner informed as to the progress, quantity and quality of construction, to keep the Owner's field records, to act as liaison between the Contractor and the Owner and to call the attention of the Contractor and the Owner to faulty or inadequate construction or any deviations of construction from the Contract Documents. Failure of such Field Engineering Representatives to call the attention of the Contractor and the Owner to faulty or inadequate construction or any deviations of construction from the Contract Documents shall not constitute acceptance of construction by the Owner. The presence or absence of Field Engineering Representatives at the Project site or the Contractor's facilities will be at the sole discretion of the Owner and such presence or absence of the Field Engineering Representatives shall not relieve the Contractor of its responsibility to furnish the Work.

c. The Field Engineering Representatives will be authorized to reject construction not deemed to be in accordance with the Contract Documents by issuing to the Contractor a written Notice of Rejected Construction. The Contractor shall appropriately modify or remove rejected construction from the site. No recommendation for payment of previously rejected construction will be made until it has been modified to conform with the requirements of the Contract Documents in the opinion of the Owner. The failure of a Field Engineering Representative to reject construction shall not constitute approval or acceptance thereof by the Owner.

d. If it should be considered necessary or advisable by the Owner at any time before final acceptance of the Work to make an examination of construction which is partially or fully completed, by disassembling, removing, tearing out, and satisfactorily reassembling or reconstructing any portion thereof, the Contractor, upon written notice from the Owner, shall promptly furnish all necessary facilities, labor and materials for such examination. If such construction is found to be defective due to the fault of the Contractor or its Subcontractors, the Contractor shall pay all the costs of such examination.

If, however, such construction is found to meet the requirements of the Contract, the Owner shall pay the Contractor as a change in construction for all labor, materials and use of equipment necessary for such examination and if such examination and reconstruction actually delays the completion of all work on the Project, the Construction Time or Construction Times shall be increased by the number of days required for such examination.

202.02 SPECIAL OBSERVATION, REVIEW AND WITNESS OF TESTING

a. If the Contract Documents or Owner's Instructions require any part of the Work to be done specially observed, reviewed or testing witnessed, the Contractor shall give the Owner five days prior notice of its readiness for such observation, review or testing witnessed. If any construction which is required to be so specially observed, reviewed or testing witnessed should be assembled or covered up without such observation, review or testing witnessed as a result of the Contractor's failure to give proper notice, the construction shall be disassembled or uncovered for such observation, review or testing witnessed and again assembled or covered at the Contractor's expense.

b. Where construction is required to be tested under the Contract, all necessary test equipment and facilities shall be furnished, set up and operated by the Contractor. The Owner will only witness such testing and shall be furnished certified copies of the test conditions and results.

c. Upon the request of the Owner, the Contractor shall furnish certificates from an independent testing laboratory or other agency acceptable to the Owner which certify that the materials or equipment supplied have been examined and tested and are in full compliance and conformance with the Contract Documents. Where such examination, testing and certification are to be conducted by an independent laboratory or agency, the sample or samples of materials to be examined and tested shall be selected by such laboratory or agency or by the Owner and shipped to the laboratory by the Contractor at the Contractor's expense. All samples of materials for tests shall be taken according to methods provided in the Contract Documents. The Contractor shall furnish, at its expense, such samples of material in reasonable quantities as may be required for examination of test.

d. At the option of the Contractor, if the costs of observation, review or testing of materials required by the Owner at the site will be greater than observation, review or testing at the point of manufacture, the Owner will observe, review or witness tests of certain materials or equipment at the manufacturer's or supplier's plant prior to delivery to the Project site. The Contractor shall pay to the Owner the reasonable cost to the Owner of such observation, review or testing including, but not limited to, the time, travel and subsistence expenses and any other expenses incurred in connection with such observation, review or testing. The costs of such optional observation, review or testing away from the Project site shall be paid each

month by the Contractor to the Owner. In the event the Contractor fails to pay said costs by the 20th day of the month following the invoicing for such services, such payment shall be deducted from any monies due the Contractor under the Contract.

202.03 SUBCONTRACTS

a. The Contractor shall perform with its own organization not less than one-third of the total monetary amount of the Contract and shall not sublet to one Subcontractor more than one-half of the total monetary amount of the Contract without the previous written consent of the Owner. After execution of the Contract and prior to the beginning of operations on a subcontract, the Contractor may, if approved by the Owner through execution of a Change Order, employ a different Subcontractor than was offered in the Contractor's Bid. In this event the Total Contract Amount shall be reduced by an amount equal to the reduction, if any, in the cost to the Contractor as a result of the change of Subcontractor. The Contractor shall furnish to the Owner the detailed bids of both Subcontractors before execution of the Change Order.

b. The Contractor shall include all applicable provisions of these Contract Documents in all subcontracts for construction to be performed under the Contract.

c. The Contractor shall be fully responsible to the Owner for the control, supervision and coordination, and the acts, errors and omissions of Subcontractors and of persons either directly or indirectly employed by them.

d. Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and the Owner. The Owner's consent to or approval of any Subcontractor under the Contract shall not relieve the Contractor of its obligations under the Contract and no such consent or approval shall be deemed to waive or modify any provisions of the Contract.

202.04 SUSPENSION OF CONSTRUCTION

a. Whenever, in the Owner's opinion, the weather is unsuitable, other conditions are unfavorable to execution of the Work or the Contractor has failed to carry out any of the provisions of the Contract, the Owner may immediately direct temporary suspension of construction, either wholly or in part, for a period up to 48 hours by causing an order to that effect to be delivered to the Contractor or its Project Construction Manager. Upon receipt of such order, the Contractor shall immediately suspend operations on that portion of the Work ordered suspended. Any temporary suspension of construction by the Owner shall not relieve the Contractor of its obligations under the Contract. The Contractor shall not be entitled to be paid for any construction performed, standby time or damages arising from violation of an order for temporary suspension.

b. The Owner may at any time order an extended suspension of the Work or any part thereof for a period not exceeding 180 days by giving 10 days prior written notice to the Contractor. Upon receipt of such notice, the Contractor shall suspend operations on that portion of the Work ordered suspended. Construction shall be resumed by the Contractor within 30 days after the date fixed in a written notice from the Owner to the Contractor to resume construction. The Owner shall reimburse the Contractor, as a change in construction, for reasonable actual additional expenses incurred by the Contractor in connection with the construction under the Contract as the result of such extended suspension; provided the extended suspension was not caused by an act, error or omission of the Contractor.

c. The Contractor shall not suspend construction operations without obtaining the prior written permission of the Owner. Such permission from the Owner shall not be a basis for an extension of Construction Time.

202.05 OWNER'S TERMINATION

If the Owner determines at any time that it is in its best interest to terminate construction or the Contract, the Owner may do so by giving the Contractor 10 days prior written notice. Upon such termination the Owner shall pay the Contractor reasonable compensation for construction furnished to the date of such termination, including an allowance of 10 percent of the Total Contract Amount for overhead and profit as full and complete payment of all amounts due or to become due under the Contract.

All completed and partly completed construction furnished shall thereupon pass to and become the property of the Owner. In no event shall the total amount of compensation paid to the Contractor exceed the Total Contract Amount.

202.06 CONTRACTOR'S TERMINATION

If all of the construction under the Contract should be legally stopped by order of any court or public authority, other than the Owner, for a period of 90 days or more, through no act or fault of the Contractor, anyone employed by it, or any of its Subcontractors, then the Contractor, after 10 days written notice to the Owner, may terminate the Contract. Upon such termination, the Owner shall pay the Contractor reasonable compensation for construction furnished to the date of stoppage, including an allowance of 10 percent of the Total Contract Amount for overhead and profit, as full and complete payment of all amounts due or to become due under the Contract. All completed and partly completed construction furnished shall thereupon pass to and become the property of the Owner. In no event shall the total amount of compensation paid to the Contractor exceed the Total Contract Amount.

202.07 EMERGENCIES

a. The Contractor shall be responsible for the safety of life and property at the Project site directly related with construction of the project and in the event of emergencies shall take such action as is necessary to prevent or mitigate injury, damage or loss without special instruction or authorization from the Owner. If such an event occurs, the contractor shall notify Owner's plant management personnel immediately, so that any additional emergency or safety actions can be taken to protect plant personnel and property. In such event, the Contractor shall notify the Owner within 48 hours of any significant changes to the Work or deviations from the Contract Documents resulting from such emergency action.

b. If the Contractor is advised that in the opinion of the Owner certain emergency construction must be done immediately to protect completed construction, the Contractor shall proceed at once with such emergency construction. If such emergency construction is within the scope of the Contract, the Contractor shall be paid as provided in the Contract. If such emergency construction is outside the scope of the Contract, the Contractor shall submit a written bid within 10 days after completion of the emergency construction and the construction shall be paid for as a change in construction. Failure to submit such a bid within the specified time shall constitute waiver of any claim based upon such emergency construction. The Owner shall have no obligation to compensate the Contractor for emergency construction required because of the Contractor's operations.

202.08 CONTRACTOR'S DEFAULT

a. If the Contractor becomes insolvent, is adjudged bankrupt or makes an assignment for the benefit of its creditors, or if a receiver, assignee or other liquidating officer is appointed for the Contractor, or if the Contractor fails to prosecute the Work according to the Construction Schedule, or persistently or repeatedly refuses or fails to supply satisfactory Superintendence, satisfactory numbers of properly skilled workmen or satisfactory construction or fails to make payment to employees or Subcontractors or payment for materials or equipment when due, or violates any law, ordinance, rule or regulation of any governmental authority having jurisdiction, or otherwise is in violation of any provision of the Contract, the Contractor shall be in default under the Contract, and if such default continues for a period of 10 days after written notice thereof is served by the Owner upon the Contractor, the Owner, without prejudice to any other right or remedy, may declare the Contractor to be in default under the Contract by written notice thereof served upon the Contractor and its Surety.

b. In the event of such declaration of default, the Surety shall have the obligation immediately to remedy the default or to undertake performance of the Contractor's obligations under the Contract; provided, however, that if the Surety does not remedy the default or does not undertake such

performance within 15 days from the date of service of such declaration of default, the Owner may take possession of all construction and of all the Contractor's equipment, tools and materials used in connection therewith and complete the construction by whatever method the Owner may deem expedient. In such event, the Contractor shall not be entitled to receive any further payment until construction is completed. If the unpaid balance of the Total Contract Amount exceeds the cost to the Owner of completing the Contract, including reasonable compensation for additional administrative, engineering and legal costs of the Owner, such excess shall be paid to the Contractor. If the cost to the Owner of completing the Contract including reasonable compensation for additional administrative, engineering and legal costs of the Owner, exceeds such unpaid balance, the Contractor shall immediately pay the excess to the Owner. The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the Owner.

202.09 LIQUIDATED DAMAGES

a. For each and every day that the Work and any specified portions thereof are not completed after the Construction Time or Construction Times fixed for completion in the Contract Documents, the Contractor shall pay the Owner, not as a penalty but as liquidated damages, such amount or amounts as are specified in Section 307.05 in the Special Conditions.

b. Because of the difficulty in computing the actual damages which will result from failure to complete the Work and any specified portions thereof on time, the said amount or amounts of liquidated damages are hereby estimated, agreed upon and determined in advance by the parties hereto as a reasonable evaluation of the actual damages which the Owner will suffer for each and every day during which the completion of the work and any specified portions thereof are delayed beyond the Construction Time or Construction Times herein fixed.

c. Such monies due the Contractor or to become due the Contractor at or after the Construction Time or Construction Times fixed in the Contract Documents for the Work and any portion thereof may be retained by the Owner, as may be necessary to pay said liquidated damages, and if such amounts are not sufficient to pay such liquidated damages, the Contractor shall immediately pay the deficiency to the Owner. Such deductions or amounts retained by the Owner shall not in any degree release the Contractor from further obligation and liability with respect to fulfilling the entire Contract.

d. Nothing contained herein shall preclude claims by the Owner for damages caused by Contractor errors, omissions, or negligence unrelated to delay in completing the construction within the Construction Time or Construction Times fixed for completion in the Contract Documents.

202.10 CONTRACTOR'S CLAIMS PRIOR TO SUBSTANTIAL COMPLETION

a. Written notice of any condition or event for which a claim is subsequently to be made by the Contractor shall be made to the Owner in writing within 2 days after the first observance of such conditions or event. A written claim for damages or additional compensation setting forth in full detail the labor, material and other costs and the total amount of the claim and the reasons therefore, shall be given to the Owner by the Contractor within 30 days after the first notice of such condition or event and if such condition or event continues, a similar written claim shall be presented every 30 days thereafter. Failure to give such notice of such condition or event and to present such detailed claims within the times specified shall constitute waiver of any claim based upon such condition or event. Knowledge of the condition or event on the part of the Owner shall not affect the requirements for written notice and written claims within the specified times.

b. The Contractor shall not cause a delay of construction during any dispute. If the Owner orders a modification of the Contract by issuing a Change Order which becomes a subject of dispute or if any interpretation of the Contract Documents or Owner's Instructions becomes a subject of dispute, the Contractor, upon written notice from the Owner, shall proceed with construction as modified by the disputed Change Order during the period required to resolve the dispute.

c. Claims for additional payment for delay in the Work caused by any act or omission of the Owner shall be limited to damages, if any, sustained during the time reasonably required for the Contractor to discharge its employees and to move equipment to another construction project location which, in the opinion of the contractor, is suitable for use of such equipment.

202.11 CONTRACTOR'S CLAIMS AFTER TERMINATION, SUBSTANTIAL COMPLETION OR DECLARATION OF CONTRACTOR'S DEFAULT

a. When in the opinion of the Owner the Contract is substantially completed, the Owner will send to the Contractor, by Registered or Certified United States Mail, a written opinion of Substantial Completion. Within 30 days after delivery of such opinion of Substantial Completion or declared default of the Contractor or termination of the Contract before Substantial Completion, the Contractor shall give the Owner written notice of any claim it intends to make against the Owner arising out of or in relation to the Contract; provided that written notice of a claim based upon an event which occurs after delivery to the Contractor of the opinion of Substantial Completion may be so given within 30 days after the occurrence of the event upon which the claim is based but in no event later than 30 days after Owner has given Notice of Acceptance of Construction. The notice of claim shall state the amount claimed and shall specify in detail the nature and grounds of the claim. The fact that the Contractor has given any notice or presented any claim required by any other provision of the Contract shall not relieve it from giving the

notice required by this paragraph of the Contract nor shall giving the notice required by this paragraph relieve the Contractor from the effect of failure to give any notice or present any claim as required by any other paragraph of the Contract.

b. Within 60 days after receipt of such notice of claim, the Owner will give the Contractor written notice that the claim is allowed, rejected or allowed in part and rejected in part. Any claim or part thereof so allowed shall constitute an acknowledged obligation of the Owner under the Contract payable in due course. Failure to give such written notice of allowance or rejection within 60 days after the Owner receives the notice of claim shall constitute rejection thereof in full. The Contractor shall not start suit on any claim until the Owner has rejected it in whole or in part or has been accorded 60 days in which to allow or reject it as above provided.

c. Within 30 days after receipt of written notice that the claim has been rejected in whole or in part, or within 90 days after the notice of claim is received by the Owner in case no notice of rejection is given, the Contractor shall bring suit against the Owner in the proper court of the county or judicial district in which the Project is located or in which the Owner has its principal place of business. Otherwise, the claim, except the portion thereof allowed by the Owner, shall be forever barred. No suit shall be brought against the Owner on any claim arising out of or in connection with the Contract unless the requirements of this paragraph applicable to the Contractor have been strictly complied with.

202.12 ASSIGNMENT OF CONTRACT

The Contractor shall not assign the Contract or assign any monies due or to become due under the Contract without the previous written consent of the Owner. No assignment of the Contract by the Contractor with the consent of the Owner shall be valid unless it contains a provision that the funds to be paid to the assignee under the assignment are subject to all the Contractor's obligations under the Contract.

202.13 WAIVER OR MODIFICATION

The failure of either party to the Contract to insist upon strict performance of any of the terms and provisions of the Contract Documents shall not constitute a waiver or relinquishment of any such terms or provisions, but the same shall be and remain in full force and effect. The making of any payment by the Owner to the Contractor, with or without knowledge of any breach of Contract, shall not be deemed to be a waiver as to any breach of any term or provision of the Contract Documents. No waiver or modification of any term or provision of the Contractor shall be claimed by the Contractor unless the same be made by Change Order, and no such waiver or modification shall constitute a waiver or modification of any other term or provision.

202.14 CONTRACTOR'S MANAGEMENT AND SUPERINTENDENCE

a. During the progress of construction, the Contractor shall keep in constant attendance at the Project site or sites a competent Project Construction Manager and necessary assistants all satisfactory to the Owner. The Project Construction Manager shall not be changed, except with the consent of the Owner, unless the Project Construction Manager ceases to be in the Contractor's employ. The Contractor shall not employ or continue to employ on the Project, a Project Construction Manager who is unsatisfactory to the Owner. The Project Construction Manager shall represent the Contractor and all directions given to the Project Construction Manager shall be as binding as if given to the Contractor. Important directions shall be subsequently confirmed in writing upon written request in each case. The Contractor shall give efficient management and Superintendence to the Work, using its best skill and attention.

b. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction; however, the Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is required by the Contract Documents.

202.15 DEFENSE COSTS

a. The Owner and the Contractor agree that in the event either of them institutes legal action against the other under the Contract the prevailing party, subject to the limitation set forth in subparagraph (b), shall be entitled to recovers its reasonable defense costs, including investigations, engineering fees, attorneys' fees, expert witnesses' fees, court costs and any other expenses of defense which it may incur subject to the limitation set forth below.

b. The Owner and the Contractor agree that in the event either of them institutes legal action against the other under the Contract, the claimant in such legal action shall pay to the other party a portion of the defense costs, including investigations, engineering fees, attorneys' fees, expert witnesses' fees, court costs and any other expenses of defense which may be incurred by such other party. Such portion of the defense costs shall bear the same ratio to the total defense costs incurred by the other party as the dollar amount of the claimant's monetary demands which were not sustained by the court bears to the total dollar amount of the claimant's monetary demands. The party or parties whose claims were not sustained in whole or in part shall pay such portion of the defense costs to the other party or parties as part of the court's assessment of costs after being furnished by the other party or parties with an itemized listing of the total defense costs incurred by deducting same from its total award.

202.16 SEVERABILITY AND HEADINGS

a. If any part of the Contract Documents, including, but not limited to, any provision, paragraph, clause, phrase or words, is found to be in conflict with applicable law, such part shall be inoperative, null and void insofar as it is in conflict with said law, but the remainder shall be given full force and effect.

b. The descriptive headings of the various parts, sections, paragraphs and other portions of the Contract Documents have been inserted for convenience of reference only and shall in no way modify or restrict any of the terms and provisions of the Contract Documents.

PART 2 - GENERAL CONDITIONS

SECTION 203 - DRAWINGS AND SPECIFICATIONS

203.01 INTENT OF CONTRACT DOCUMENTS

a. Except as otherwise provided in the Special Conditions, the intent of the Contract Documents is to include all plant, materials, equipment, tools, supplies, management, Superintendence, Contractor's design and detailing, labor, transportation, fuel, and all other utilities and services necessary for furnishing all of the construction required for the proper performance of the Contract with the exception of electrical power and water which shall be furnished by Owner.

b. Except as otherwise provided in the Special Conditions, the intent of the Contract Documents is to require complete construction and to specify and set forth a complete operating unit or system ready for use regardless of whether or not every detail has been set forth in the Contract Documents. Any omission of details from the Contract Documents shall not be construed to mean that they are to be omitted by the Contractor or to affect in any way the completeness of construction. The cost of such details shall be included in the prices in the Bid.

c. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the code of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual or code in effect on the date of issuance of the Notice to Bidders unless otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the Owner or Contractor, or any of their agents or employees from those set forth in the Contract Documents.

203.02 CONFLICT AND PRECEDENCE

The Contract Documents are complementary and what is called for by any one of them shall be as binding as if called for by all of them. In the event there are any conflicting provisions or requirements in the component parts of the Contract, the several Contract Documents shall take precedence in the following order:

1. Change Orders
2. Agreement
3. Addenda
4. Special Conditions

5. General Conditions
6. Engineering Specifications
7. Contract Drawings
8. Construction Schedule
9. Notice to Bidders
10. Instruction to Bidders
11. Performance and Labor and Material Payment Bonds
12. Bid

203.03 DISCREPANCIES IN CONTRACT DOCUMENTS

a. If at any time the Contractor discovers that there is possible error, omission or discrepancy in any of the Contract Documents, the Contractor shall immediately notify the Owner in writing. The Owner will promptly review the alleged error, omission or discrepancy and issue an Owner's Instruction or the Owner may issue a Change Order. Any work done on that portion of the Project affected by such alleged error, omission or discrepancy after such discovery and until receipt of an Owner's Instruction or issuance of a Change Order shall be at the Contractor's expense.

b. To avoid any disputes which might arise as to the meaning of any engineering requirements in the Contract Documents or to any alleged error, omission or discrepancy herein, the Owner's opinion as to the true intent and meaning, and the Owner's interpretation thereof, shall first be obtained. If the Owner's opinion is not satisfactory to the Contractor, a request may be made in writing to the Owner for a final determination. The determination of the Owner shall be obtained before any legal action is taken by the Contractor. All dimensions shall be taken from the figures on the Contract Drawings and no dimensions measured from such drawings shall be valid. If dimensions are omitted, operations shall not be started on that part of the construction until the necessary dimensions have been obtained from the Owner in an Owner's Instruction or on a Contract Drawing.

203.04 OWNERSHIP OF ENGINEERING DATA

All reports, analyses, designs, design criteria, computations, drawings, specifications, estimates, survey notes, site investigations and other office and field data prepared by or for the Owner, and all copies thereof, are and shall remain the property of the Owner. Such data shall not be duplicated or used for additions to the Project or for other projects and, with the exception of the executed sets of Contract Documents, shall be returned to the Owner upon completion of the Work. All models required to be furnished by the Contractor, if any, shall become the property of and shall be delivered to the Owner upon completion of the Work.

203.05 DRAWINGS, SPECIFICATIONS AND INSTRUCTIONS

a. The Owner has prepared technical specifications and the Contract Documents. The Owner may issue additional information during the term of

the Contract by means of Owner's Instructions or construction drawings, to add detail to the Contract Documents. All such Owner's Instructions and construction drawings shall be consistent with the Contract Documents and shall be developments thereof.

b. All construction shall be furnished in accordance with the Contract Documents and to the dimensions fixed thereby. The Owner reserves the right to make reasonable revisions in dimensions and relocations of construction; provided, however, that such revisions or relocations are made prior to construction of any item to be revised or relocated. If such revisions and relocations result in no additional cost to the Contractor, such revisions or relocations shall be made at no additional cost to the Owner.

203.06 CONTRACTOR'S COPIES OF CONTRACT DOCUMENTS

In addition to the one (1) set of executed Contract Documents given the Contractor upon signing the Contract, the Contractor will be supplied by the Owner, without charge, not more than two (2) sets of Contract Documents. Additional copies of Contract Documents and either full or reduced size Contract Drawings, if desired by the Contractor, will be furnished by the Owner at the cost to the Owner of reproduction, handling and mailing or shipping. The Contractor shall keep one set of Contract Documents, currently annotated to show all changes made during construction, at the Project site in good condition in a weather-tight enclosure and available to the Owner at all times.

PART 2 - GENERAL CONDITIONS

SECTION 204 - MATERIALS AND WORKMANSHIP

204.01 MATERIALS AND EQUIPMENT

a. Unless otherwise provided in the Special Conditions, the Contractor shall furnish and fully pay for all construction prior to acceptance by the Owner. All materials and equipment incorporated in the Work shall be new and not previously used. If requested by the Owner, the Contractor shall provide satisfactory evidence of the kind and quality of materials and equipment to be furnished.

b. If materials or equipment are specified in the Special Conditions to be furnished by the Owner, they shall be conclusively deemed acceptable for the purpose designed if received in satisfactory condition. The Contractor may continue to use such materials or equipment until otherwise directed; provided, however, that if the Contractor discovers any defect in materials or equipment furnished by the Owner, it shall immediately notify the Owner in writing and shall cease to use such defective items pending receipt of written instructions from the Owner.

c. If materials or equipment are specified in the Special Conditions to be furnished by the Owner, they shall be received by the Contractor f.o.b. the point of delivery specified in the Special Conditions, and in the absence of such specification, receipt by the Contractor shall be f.o.b. the plant of the supplier of the materials or equipment to be so furnished. The Contractor shall receive, load and unload, transport, store and properly protect from damage or loss all such materials or equipment and the Contractor shall be responsible for loss or damage after receipt of materials or equipment and until final acceptance of construction by the Owner. The Contractor shall immediately report to the Owner in writing in the form and manner prescribed by the Owner the receipt of Owner-furnished materials or equipment.

204.02 WORKMANSHIP

All construction shall be such that its several component parts function as a workable system with all accessories necessary for its proper operation, and all construction shall be furnished with components tested, properly adjusted, and in satisfactory operation. Construction shall be furnished in conformance with the generally accepted standard practice of the trade so as to contribute to maximum efficiency of operation, accessibility, appearance, minimum cost of operation, maintenance and

construction of future alterations and additions. The completed construction shall conform and adjust to and operate in a coordinated manner with the existing installation, if any.

204.03 COMPLIANCE WITH CONTRACT DOCUMENTS

a. Whenever in the Contract Documents any material, equipment, method or process is indicated or specified without reservation, by patent or proprietary name, by name of the manufacturer or by catalog number, such specification shall be deemed to be used for the purpose of establishing a standard of quality and for facilitating the description of the material, equipment, method or process desired and, whether or not so designated, shall be deemed to be followed by the words "or equal". The Contractor may offer to furnish another material, equipment, method or process which shall be substantially equal in every respect to that so indicated or specified. In such event the Owner shall be the sole judge of the equality of such material, equipment, method or process offered in substitution.

b. Offers of substitution for items described in the Contract Documents will be considered only upon the written request of the Contractor, and no requests for such substitutions will be acknowledged or considered from suppliers, distributors, manufacturers, Subcontractors or other sources. Requests for approval of a substitution shall be by submitting Shop Drawings and shall be accompanied by documentary evidence of equality in the form of descriptive literature, samples, records of performance, certified copies of tests by independent recognized laboratories, and differences in price and delivery, if any, in the form of certified quotations from suppliers of both the specified material, equipment, method or process and the proposed substitute.

c. Such offers of substitution of materials or equipment shall include data to substantiate that the "or equal" product meets the following criteria applicable to the item submitted:

(1) the change is adaptable to the design,

(2) the functional performance will be equal to or better than the item specified,

(3) where appearance affects the end product, the appearance of the item will be as good as or better than the item specified,

(4) the maintenance cost for the product or item will be equal to or less than the item specified,

(5) the quality of materials used and the level of construction of the item will be as good as or better than the item specified,

(6) the net price of the item will be within the same price range as the item specified, and

(7) the cost to the Owner of furnishing and installing the item, including any necessary evaluation and redesign costs which shall be reimbursed to the Owner by the Contractor, will be equal to or less than that of the item specified.

d. When substitute materials or equipment necessitates changes to or coordination with any other portion of the Work, the data submitted shall include Shop Drawings showing all such changes. As part of any acceptance of substitute materials or equipment, the Contractor shall furnish all materials, perform all installation and make all other modifications as may be required to incorporate such changes at no additional cost to the Owner.

204.04 STORAGE OF MATERIALS AND EQUIPMENT

If any materials or equipment are stored, they shall be stored so as to ensure the preservation of their quality and fitness. Materials and equipment shall be placed on platforms or other hard, clean surfaces, and not on the ground, and shall be placed under cover and heated adequately to prevent condensation or freezing. Stored materials and equipment shall be located so as to facilitate observation. The Contractor shall be responsible for all damage or loss that occurs as a result of its fault or negligence in connection with the care and protection of all materials and equipment until acceptance by the Owner.

204.05 MANUFACTURER'S INSTRUCTIONS

All instructions and directions of the manufacturer of material and equipment furnished to the Contractor shall be followed unless specified to the contrary. The Contractor shall obtain and furnish to the Owner prior to use of materials or installation of equipment five (5) copies of all instructions and directions of the manufacturer of such materials and equipment furnished by the Contractor. Instructions and directions for any Owner-furnished materials and equipment will be furnished to the Contractor.

204.06 WARRANTIES

a. The Contractor warrants to the Owner that all construction equipment and materials to be provided under the Contract shall be fit for the purpose specified when operated or used in accordance with generally accepted operating practices; shall be new and free from defects in material, workmanship, and title; shall meet all specifications, including those relating to performance, contained or incorporated by reference in the Contract; and shall be installed under technical direction performed in a competent and diligent manner in accordance with generally accepted professional practices.

b. The foregoing warranties, except as to title, shall apply to defects or deficiencies occurring within a period of 1 year from substantial completion of construction of the Project provided the same is not unreasonably delayed by the Owner or others. If, however, during the above 1 year warranty period the construction is not available for operation due to a failure to meet such warranties, such time of unavailability shall not be counted as part of the warranty period. The conditions of any field tests shall be mutually agreed upon, and the Contractor shall be notified of and may be represented at all tests that may be made.

c. If construction furnished does not meet the foregoing warranties, assuming normal and proper use and maintenance, the Owner shall promptly notify the Contractor and make the construction available for correction. The Contractor shall thereupon within a reasonable time correct all defects, including non-conformance with the Engineering Specifications, by either repairing or replacing any defective or damaged parts of the Work furnished under the Contract. The cost of labor, materials and equipment directly associated with such repair or replacement of the construction, including removal, loading and unloading, transportation to and from the repair site and reinstallation; shall be borne by the Contractor. This obligation, however, is limited to the construction furnished and does not include any responsibility or obligation with respect to removal or replacement of structures, equipment or other parts of the Project not furnished by the Contractor.

d. Any repaired or replacement construction furnished under the foregoing warranties shall carry warranties on the same terms as set forth above for one year from the date of its repair or replacements.

e. The foregoing warranties are cumulative and in addition to all other warranties whether written, oral or implied. There is no implied warranty of merchantability or fitness for purpose.

f. The Contractor shall obtain written warranties from its Subcontractors and suppliers of material and equipment where such warranties are specifically required by the Special Conditions and shall deliver the original warranties to the Owner. Such Subcontractor warranties shall be in addition to the general warranties required from the Contractor by this paragraph.

g. Neither the final payment, nor any other provision of the Contract, nor partial or entire use of the Work by the Owner shall relieve the Contractor of liability with respect to the warranties referred to in the Contract or any other warranties express or implied.

204.07 DEFECTIVE MATERIALS AND WORKMANSHIP

a. The Contractor shall promptly remove from the premises all materials and equipment and correct all construction which in the opinion of the Owner

fails to conform to the Contract Documents, whether incorporated in the Work or not, and the Contractor shall promptly replace and re-execute its own construction in accordance with the Contract Documents and without expense to the Owner, and shall bear the expense of making good all construction of other contractors destroyed or damaged by such removal and replacement.

b. If the Contractor does not promptly remove from the premises all materials and equipment and correct all construction which in the opinion of the Owner fails to conform to the Contract Documents, within a reasonable time which shall be fixed by written notice from the Owner, the Owner may remove and store the materials at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within 10 days after delivery of a notice of the cost of such removal and storage, the Owner may give written notice to the Contractor and 10 days after such notice the Owner may dispose of the material. Costs arising from such disposal of materials and correction of the construction shall be paid by the Contractor and may be deducted from any payment due the Contractor.

PART 2 - GENERAL CONDITIONS

SECTION 205 - BONDS-LIABILITY-INSURANCE

205.01 PERFORMANCE, MAINTENANCE AND STATUTORY BONDS

a. Within 10 days after the Contractor receives the Notice to Apparent Low Bidder, and prior to the execution of the Contract, the Contractor shall furnish a Performance Bond, Maintenance Bond, and a Statutory Bond in the form acceptable to the Owner, which form is included in the Contract Documents, with corporate Surety satisfactory to the Owner. Such bonds shall insure the full and faithful performance of the Contract and the payment of all obligations arising thereunder, and shall each be in an amount equal to 100 percent of the Total Contract Amount unless otherwise provided in the Special Conditions.

b. Such bonds shall further comply in all respects with the laws of the State in which the Project site is located.

c. The Surety on such Performance Bond, Maintenance Bond, and Statutory Bond shall be a duly licensed surety corporation authorized to do business in the State where the Project site is located. The Surety shall be listed by the United States Treasury Department as holding a Certificate of Authority from the Secretary of the Treasury as being acceptable as a Surety for Federal projects. No Surety's liability shall exceed the underwriting limitations specified by the United States Treasury Department for the respective Surety.

d. In the event the Surety for any bond furnished by the Contractor is declared bankrupt or becomes insolvent or ceases to meet the requirements set forth above in this paragraph, the Contractor shall furnish within five days a substitute bond from a Surety meeting all requirements of this paragraph.

205.02 PATENTS AND ROYALTIES

a. The Contractor shall pay the costs of all royalties, permits, licenses or other fees necessary for the performance of the Contract.

b. The Contractor warrants that the Work furnished hereunder, and any part thereof, shall be delivered free of any rightful claim of any third party for infringement of any patent. If notified promptly in writing and given authority and information, the Contractor shall defend or may settle, at its expense, any suit or proceeding against the Owner so far as it is based on a claimed patent infringement which would result in a breach of this warranty and the

Contractor shall pay all damages and costs awarded therein against the Owner due to such breach. In the event the Work or any part thereof is held to constitute such an infringement and the use of said Work or part is enjoined, the Contractor shall, at its expense and option, either procure for the Owner the right to continue using said construction or part, or replace same with non-infringing construction, or part, or modify same so it becomes non-infringing.

c. The preceding subparagraph shall not apply to any construction or part manufactured to the Owner's design, or to the use of any construction furnished hereunder in conjunction with any other product in a combination not furnished by the Contractor pursuant to the Contract. As to any such construction, part, or use of such combination, the Contractor shall have no liability whatsoever for patent infringement and the Owner will hold the Contractor harmless against any infringement claims arising there from.

d. This Patents and Royalties paragraph states the entire liability of the Contractor for patent infringement by said construction or any part thereof.

205.03 LAWS AND REGULATIONS

a. The Contractor shall give all notices required by law and comply with all laws, ordinances, rules and regulations relating to the performance of the Work. The Contractor shall be liable for all violations of the law in connection with construction furnished by the Contractor.

b. It shall not be the Contractor's responsibility to make certain that the Contract Documents conform to applicable laws, ordinances, rules and regulations; however, if the Contractor observes that the Contract Documents are at variance with any law, ordinance, rule or regulation, the Contractor shall promptly notify the Owner in writing and all necessary changes shall be made by Owner's Instruction or Change Order. If the Contractor knowingly performs any work contrary to such laws, ordinances, rules and regulations without having given such notice to the Owner, the Contractor shall bear all costs of required changes and be liable to the Owner for all damages arising there from.

205.04 PERMITS

a. Permits, licenses and easements of a temporary nature, which are necessary only for and during construction, shall be secured and paid for by the Contractor, except those permits, licenses or easements of a temporary nature which are described in the Special Conditions as being provided by the Owner.

b. Permits, licenses, and easements of a permanent nature, which are necessary to be maintained after acceptance of construction, shall be secured and paid for by the Owner.

205.05 INDEMNITY

a. The Contractor shall indemnify, defend and hold harmless the Owner and the Owner's officers, partners, agents, employees and servants from and against any and all claims, judgments, liens, loss, damage, cost, charge or expense including defense costs, court costs and attorneys' fees, whether direct or indirect, by reason of liability imposed by law or by contract upon the Owner or said other parties because of bodily injuries, including death at any time resulting there from, sustained by any person or persons or on account of damages to property, including loss of use thereof, arising out of or in consequence of the performance of the Contract whether such injuries to or death of persons or damages to property are due or are claimed to be due to operations, errors, omissions, or negligent acts of the Contractor, its Subcontractors, the Owner, and said other parties, excepting only such injuries or damages as shall have been finally determined to have resulted solely from the errors, omissions or negligent acts of the Owner or said other parties or independent contractors directly responsible to the Owner.

b. The Contractor shall indemnify, defend and hold harmless the Owner and Owner's, officers, partners, agents, employees and servants from and against any and all claims, judgments, liens, loss, damage, cost, charge or expense including defense costs, court costs and attorneys' fees, whether direct or indirect, by reason of casualties to the use thereof, whether such casualties to the Work are due or claimed to be due to operations of the Contractor, its Subcontractors, the Owner, or said other parties, excepting only such casualties as shall have been finally determined to have resulted solely from the errors, omissions or negligent acts of the Owner or of said other parties, or independent contractors directly responsible to the Owner.

205.06 GENERAL LIABILITY INSURANCE

a. Coverage

The Contractor shall purchase and maintain General Liability Insurance covering bodily injuries, including death at any time resulting there from, sustained by any person or persons and damages to property, including loss of use thereof, arising out of or in consequence of the performance of the Contract, whether such injuries to or death of persons or damages to property are due or are claimed to be due to operations, errors, omissions or negligent acts of the Contractor, its Subcontractors, the Owner, or any of the Owner's officers, partners, agents, employees or servants, excepting only such injuries or damages as shall have resulted solely from the operations, errors, omissions or negligent acts of the Owner or of the said other parties, or independent contractors directly responsible to the Owner.

b. Insurance Amounts

Such General Liability Insurance shall be in an amount not less than $1,000,000 combined single limit per occurrence for bodily injuries and/or death and/or property damage. Provided that, with respect to the Owner, the amount of such insurance shall not exceed $175,000 for bodily injuries or death to any one person, $1,000,000 for bodily injuries or death of any number of persons in one occurrence and $25,000 for property damage in any one occurrence, or such other amounts as are specified in the Oklahoma Governmental Tort Claims Act with respect to the Owner.

c. Insurance Period

Such General Liability Insurance shall be maintained in effect until final acceptance by the Owner of completed construction and, for products liability and completed operations liability, at least two years thereafter.

d. Insurance Form

Such General Liability Insurance shall indemnify and defend the Contractor, its Subcontractors, the Owner and all of the Owner's officers, partners, agents, employees and servants from and against any and all claims, judgments, liens, loss, damage, cost, charge or expense, including defense costs, court costs and attorneys' fees, whether direct or indirect, by reason of liability imposed by law or by contract upon said parties, including Operations/Premises Liability, Completed Operations and Products Liability, Broad Form Blanket Contractual Liability, Contingent Employers or "Stop Gap", Owned, Nonowned, and Hired Vehicles and Equipment, and Broad Form Property Damage, including explosion, collapse and underground damage and loss of use. Such General Liability Insurance shall be provided on a comprehensive bodily injury or property damage liability form satisfactory to the Owner with a cross liability clause and shall name the Owner as an insured.

205.07 WORKMEN'S COMPENSATION

a. Insurance Requirements

The Contractor and its Subcontractors shall purchase and maintain industrial accident or workmen's compensation insurance issued by the State or, if state insurance is not available, issued by a private company covering bodily injuries, including death at any time resulting there from, suffered or alleged to have been suffered by any employee of the Contractor or its Subcontractor by reason of or in the course of operations under the Contract.

b. Insurance Amount

The amount and type of such industrial accident or workmen's compensation insurance shall be that required by law for all employees employed under the Contract who may come within the protection of such laws, and in the absence of such laws, the amount and type shall be that required by the Owner.

c. Insurance Period

Such industrial accident and workmen's compensation insurance shall be maintained in effect until final acceptance of completed construction.

205.08 CASUALTY INSURANCE

a. Insurance Requirement

The Contractor shall purchase and maintain Builders' Risk "All-Risk" insurance covering loss by casualty of all or any part of the Work whether completed or not to indemnify itself from losses imposed by law or assumed under the Contract by the Contractor. Such insurance shall include, but not be limited to, loss by fire, earthquake, landslide, flood, damage resulting from faulty workmanship, materials, design or construction furnished by the Contractor, and vandalism. The Contractor and Owner shall each be named as insureds as their interests may appear.

b. Insurance Amount

Such Builders' Risk "All-Risk" insurance shall be equal to the Total Contract Amount.

c. Insurance Period

Such Builders' Risk "All-Risk" insurance shall be maintained in effect until final acceptance of completed construction.

205.09 CERTIFICATION AND CANCELLATION OF INSURANCE

a. All insurance required under the Contract shall be provided on policy forms and by companies satisfactory to the Owner.

b. Bidder shall name Siemens Energy. Inc. and its Subcontractors as “additional insureds” under Bidder’s Commercial General Liability and Automobile Liability policies to the extent that bodily injury (including death) or third party property damage results from the negligent acts or omissions of such subcontractor or its lower-tier subcontractors. The Bidder’s Commercial General Liability and Automobile Liability policies shall contain “separation of insureds” clauses and the coverage afforded to additional

insureds shall apply as primary and noncontributing with any other coverage available to such additional insureds.

c. The Contractor shall not cause any insurance policy to be canceled, permit any policy to lapse or reduce the amount of such insurance during the period of the Contract. All insurance policies shall include a provision to the effect that the insurance policy shall not be subject to cancellation, lapse, or to a reduction in the amount of insurance until written notice has been delivered to the Owner by the insuring company stating the date that such cancellation, lapse or reduction shall be effective, which date shall not be less than 15 days after the delivery of such notice.

d. Within 10 days after delivery of Notice to Apparent Low Bidder and prior to execution of the Contract, the Contractor shall file with the Owner certificates from its insurance companies certifying to the coverage of all insurance required herein and, if required in the Special Conditions, furnish copies of all insurance policies. All certificates of insurance shall be authenticated by the proper officer of the insurer and shall certify the names of those insured, the type and amount of the insurance, the location and operations to which the insurance applies, the expiration date, and that the insuring company will give notice to the Owner at least 15 days prior to the effective date of any cancellation, lapse, or reduction in limits.

PART 2 - GENERAL CONDITIONS

SECTION 206 - PROGRESS AND COMPLETION

206.01 NOTICE TO PROCEED

At some time after the execution of the Contract, written Notice to Proceed will be given by the Owner to the Contractor. The Contractor shall begin work within 10 days after delivery of the Notice to Proceed and shall continue regularly thereafter, unless otherwise directed in writing by the Owner or duly constituted authority, with such work force, materials and equipment as to ensure the completion of the Work within the Construction Time or Construction Times stated in the Contract Documents.

206.02 TIME

All times and time limits stated in the Contract Documents shall be of the essence of the Contract. All references to days shall mean calendar days and the time within which acts are to be done shall be computed by excluding the first and including the last day, and if the last day is a Sunday or legal holiday where the act is to be performed, the act shall be completed on the next business day.

206.03 CONSTRUCTION TIME

The Contractor agrees to complete the Work and any specified portions thereof to the reasonable satisfaction of the Owner within the number of days of Construction Time or Construction Times set forth in the Special Conditions or the Bid, whichever is earlier, except for unavoidable delays as defined herein. All changes in Construction Time or Construction Times shall be made only by Change Orders to the Contract.

206.04 CONSTRUCTION SCHEDULE

a. The Contractor will be required to meet the schedule as provided in the Owner’s Engineer’s Technical Specifications.

b. If the Contractor's actual progress fails to meet the Construction Schedule, the Contractor shall increase its work force and equipment as required to bring the actual progress of its operations into conformance with the Construction Schedule without additional cost to the Owner.

c. The Contractor's Requests for Payment will be considered and payments made by the Owner on the basis of the Contractor's actual progress in relation to the dates shown in Part 2, General Conditions, Section 207, Measurement and Payment, Section 207.01, Payment of the Contract Amount for completion of various parts of the Work. During the course of

construction the Contractor shall enter on the Construction Schedule its estimate of progress at the end of each calendar month, or at such more frequent intervals as directed by the Owner, and shall deliver two (2) copies to the Owner and one (1) copy to Owner's Engineer with each submittal of the Contractor's Request for Payment.

d. If, at any time, the Contractor desires to change the scheduling of its operations from that required by the Construction Schedule, it shall submit proposed revisions to the Owner along with supporting data to show the effect of such revisions on the Project. The Owner may choose to accommodate minor revisions for activities not affecting Construction Time or Construction Times without formal modification of the Construction Schedule. All changes of Construction Schedule which include a change of Construction Time or Construction Times shall be made as Change Orders to the Contract.

206.05 CHANGES IN CONTRACT

a. If the Contractor claims that the Owner's Instructions or additional requirements of the Owner, by drawings or otherwise, entitle the Contractor to additional payment or extension of time under the Contract, the Contractor shall deliver to the Owner a written bid of changes in the Total Contract Amount and Construction Time or Construction Times within 10 days after the receipt of such instructions or requirements and before proceeding to execute the changes. Failure of the Contractor to deliver such a bid shall constitute a waiver by the Contractor of any claim for additional payment or extension of time. When the Owner and the Contractor are in agreement as to changes in the Total Contract Amount and Construction Time or Construction Times, the Owner will issue a Change Order to the Contract for approval of the Owner and the Contractor.

b. By proper action of its governing body and without invalidating the Contract, the Owner may order changes in the Contract Documents requiring changes in construction provided such changes are within the general scope of the Contract. No official, employee, agent or representative of the Owner, with the exception of the governing body empowered to accept and authorize execution of the Contract, shall have power to authorize any change in the Contract. It shall be the responsibility of the Contractor, before proceeding with any change, except a change which is an emergency in the opinion of the Owner, to determine that the execution of a Change Order has been properly authorized on behalf of the Owner by its governing body. When a change in the Contract is ordered by the Owner, a Change Order shall be executed by the Owner and the Contractor.

206.06 EXTENSION OF TIME

a. Should the completion of construction required under the Contract be delayed beyond the Construction Time or Construction Times herein

specified, the Owner may execute a Change Order granting the Contractor additional time for completion. If the failure of the Contractor to complete the Work within said specified time results from unavoidable delay as hereinafter defined, the Construction Time or Construction Times shall be extended by the number of days lost as a result of the unavoidable delay, provided, however, that the Contractor shall make a claim to the Owner in writing for such extension of time as herein provided. In considering applications for extension of time, the Owner shall classify delays according to the following definitions:

(1) Unavoidable delays in the prosecution or completion of the Work shall include delays in completion due to Contract modifications ordered by the Owner, unforeseeable delays in the completion of the construction of other contractors employed by the Owner, floods, fire, war, the public enemy and Acts of God, insofar as they necessarily interfere with the Contractor's completion of the Work. Delay due to adverse weather conditions, except for Acts of God, Will Not be regarded as unavoidable delays as the Contractor shall plan its construction with prudent allowance for such conditions.

(2) Avoidable delays in the prosecution or completion of the Work shall include all delays which in the opinion of the Owner could have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or its Subcontractors. Delays in the prosecution of parts of the Work which may in themselves be unavoidable but do not necessarily prevent or delay the prosecution of other parts of the Work nor the completion of the Work within the time herein specified; reasonable loss of time resulting from the necessity of submitting Shop Drawings to the Owner for review and from the making of surveys, measurements, and observations; and such interruptions as may occur in the prosecution of the Work on account of the reasonable interference of other contractors employed by the Owner which do not necessarily prevent the completion of the Work within the time herein specified, shall constitute avoidable delays within the meaning of the Contract.

b. Claims for extension of time shall be made in writing to the Owner no later than 10 days after occurrence of the event causing the delay. In the event of continuing cause of delay, only one claim shall be necessary if the claim notice indicates its continuing nature. Failure to make such claim within the time specified shall constitute waiver of such claims.

c. No claim for delay shall be allowed on account of failure to furnish construction drawings until 10 days after written request for such drawings has been made by the Contractor to the Owner. There may be some construction drawings which cannot be made until certain work has been done by the Contractor. Request for such construction drawings shall not be effective, so as to start the running of the 10 day period, until the

Contractor's work has advanced to the point which will enable and require such construction drawings to be made.

206.07 OWNER'S USE OF CONSTRUCTION

a. The Owner shall have the right to take possession of, use and collect revenues from any completed, partially completed, satisfactory or unsatisfactory portions of the Work after the time for completion of the Work has expired, but such taking possession and use shall not be deemed an acceptance of any construction not completed in accordance with the Contract Documents.

b. The Owner will be responsible for all damages incurred as a result of use of the Work except when such damages occur as a result of incomplete construction or faulty workmanship or materials. Prior to using any portion of the Work, the Owner will file with the Contractor an inventory of construction yet to be completed.

c. The Owner will hold harmless the Contractor for injury or death to persons or damage to property incurred as direct result of the Owner's use of the Work; provided, that said injury, death or damage is not a result of the Contractor's negligence and did not occur as a result of the construction being not completed by the Contractor. The Contractor shall not be entitled to any extra compensation for or extension of time due to costs to the Contractor arising from the use of any portion of the Work by the Owner.

PART 2 - GENERAL CONDITIONS

SECTION 207 - MEASUREMENT AND PAYMENT

207.01 PAYMENT OF THE CONTRACT AMOUNT

a. The Owner hereby agrees to pay to the Contractor as full compensation for the complete performance of the Contract a sum of money equal to the Total Contract Amount. All payments, except for the final payment, shall be subject to the withholding of 5% of the payment amount as Retained Amount pursuant to the Public Competitive Bidding Act (61 O.S. § 113.1 – Partial Payment – Retainage). Progress payments will be made on the following schedule.

(1)	Contract Signing	5% of Total
(2)	Completion of engineering drawings for construction and acceptance by Owner's Engineer.	10% of Total
(3)	All major equipment orders placed.	10% of Total
(4)	Completion of pad construction, footings, and foundations.	30% of Total
(5)	Erection of all steel support structures. Installation and adjustment of all switches, bus, jumpers, connectors, control building and circuit breakers. Installation and testing of security fence grounding, circuit breaker controls, & wiring and testing of all protective relays.	35% of Total
(6)	Upon successful operation & placed into service	10% of Total
(7)	30 days after final acceptance by Owner including completion of any punch list items as per Section 207.04 Partial Payments, subsection (f).	Release of Retained Amount

b. The making or method of any payment to the Contractor under the Contract shall not relieve the Contractor of any obligations thereunder. The Contractor is obligated to complete the Contract in its entirety and to deliver to the Owner such completed construction as is specified in the Contract. Until the Contract is fully performed by the Contractor, the Contractor shall be obligated to repair, replace, restore, or rebuild any fully or partially completed construction required to be provided under the Contract which

may not be in conformance with the Contract; provided, however, at the option of the Owner, with respect to any portion of the Work, this particular obligation of the Contractor may be terminated by the Owner upon the completion by the Contractor and acceptance by the Owner of such portion, and such portion shall become the sole property and responsibility of the Owner when acceptance and payment therefore is made, except that the Contractor's warranty and Performance and Labor and Material Payment Bonds shall remain in force for the period provided herein.

207.02 PAYMENT FOR CHANGES

Payment for all changes in lump sum items shall, at the option of the Owner, be determined in one of the following ways:

(1) by Contractor's bid and Owner's acceptance of reasonable lump sum prices, or

(2) by payment to the Contractor on a cost basis plus certain allowances as follows:

Items for which payment will be made on a cost plus basis	Percentage allowance for overhead and profit in addition to net cost
Labor	20%
Materials and equipment	10%
Use of Equipment	15%

207.03 PAYMENT FOR UNCORRECTED CONSTRUCTION

If, in the opinion of the Owner, it is inexpedient, impractical or otherwise not in the best interests of the Owner, to correct construction which has been damaged, which is faulty, or which has not been furnished in accordance with the Contract, an equitable reduction in the Total Contract Amount shall be made.

207.04 PARTIAL PAYMENTS

a. Partial payments of the Total Contract Amount will be made as specified in the Contract Documents.

b. The Contractor may submit to the Owner, not later than the 10th day of each month, a Contractor's Request for Payment for construction completed during the previous calendar month. An additional copy shall be submitted to Owner’s Engineer at the same time. Such Contractor's Request for Payment shall be in the form provided in the Special Conditions. With each

Contractor's Request for Payment, the Contractor shall, if required, submit satisfactory evidence of payment, for materials and labor, including payments to Subcontractors, made during the previous month. Each Contractor's Request for Payment shall be computed from construction completed on all items listed in the Bid Schedule less the Retained Amounts specified and less all previously approved Contractor's Requests for Payment. Partial payment may be made for partially completed construction to the extent completed in the opinion of the Owner.

c. Partial payments on Change Orders previously executed by the Owner may be made periodically at the same time and in the same manner as partial payments on the Total Contract Amount.

d. Within 20 days after proper submission of Contractor's Request for Payment by the Contractor, the Owner will:

(1) authorize payment of the Contractor's Request for Payment submitted, or

(2) authorize payment of such other amount as is due the Contractor, in the opinion of the Owner, informing the Contractor of the amount authorized.

e. The Owner may authorize a partial payment to the Contractor, on the basis of the Contractor's Request for Payment, but the Owner will withhold a Retained Amount as specified in the Special Conditions and such other amounts as are deemed appropriate.

f. The Retained Amount will be held by the Owner as a fund for the protection and payment of any person or persons, mechanic, Subcontractor, or material supplier who shall perform any labor under the Contract or construction thereunder, and all persons who shall supply such person or persons or Subcontractors with materials and supplies for the carrying on of such Work. Said fund will be retained for a period of 30 days following the acceptance of the completed construction under the Contract, and every person performing the labor or furnishing materials and supplies toward the completion of said construction shall have a lien upon said fund provided proper notice of the lien be given as required by law. Following such 30 day period, the fund or the amount thereof in excess of a sum sufficient to meet and discharge the claims of material suppliers and laborers who have duly filed their claims under the law, together with a sum sufficient to pay the cost of such action and to pay attorneys' fees, will be paid to the Contractor.

g. Quantities used for estimating partial payments shall be considered only as approximate and provisional, and shall be subject to recalculation, adjustment and correction by the Owner in subsequent partial payments and in final payment. Inclusion of any quantities in partial payments, or failure to

reject construction at the time of partial payment, shall not constitute acceptance of the corresponding construction.

h. The Contractor, or any of its Subcontractors, may at the Contractor's option secure "Off-site" warehouse space for storage of materials for this Project which the Owner transfers to the custody of the Contractor, provided that:

(1) the warehouse shall be bonded, structurally sound, dry, lighted and suitable for the materials to be stored,

(2) the warehouse shall be within a 25-mile radius of the Project, except that another location may be utilized, if approved in writing by the Owner,

(3) only materials for the Project shall be stored within the warehouse or a secure portion of the warehouse set aside for the Project,

(4) the Contractor shall furnish the Owner a Certificate of Insurance extending its insurance policy for damage, fire, and theft to include the full value of all materials stored, and while in transit,

(5) the warehouse or secure portion thereof shall be continuously under lock and key and only the Contractor's authorized personnel shall have access,

(6) the authorized representatives of the Owner shall at all times have the right of access to the warehouse space in company of the Contractor, or its authorized representative,

(7) the Contractor and its bonding company shall accept total responsibility for all materials stored in such warehouse space,

(8) the Contractor shall furnish to the Owner certified lists of the materials stored, and other information as may be required, and also notice of the time when said materials are to be moved from the warehouse to the Project site, and

(9) the Contractor shall furnish the Owner a statement from its bonding company of acknowledgment and consent to the inclusion of the "Off-site" storage as a part of its contractual and bonding responsibilities.

i. Neither the Owner's right of access or the acceptance of certified lists of materials stored "Off-site" shall relieve the Contractor or its bonding company of any responsibility under this Contract, nor shall such actions result in liability on the part of the Owner.

j. If requested by the Owner, the Contractor shall include with each Request for Payment, after the first, an affidavit stating that all Subcontractors and Supply Contractors have been paid, less earned retainage, as their interests appeared in the last payment received, and shall be accompanied by a signed receipt from each Subcontractor and Supply Contractor that they have received payment for the previous month's work, less earned retainage, and an affidavit by such Subcontractors stating that all Subcontractors, suppliers, wages, fringes and taxes arising out of such subcontracts have been paid as their interests appeared in the last payment received.

k. When so requested by the Owner as specified above, no Request for Payment by the Contractor will be processed unless accompanied by such Contractor's affidavit. In the event the Subcontractors and Supply Contractors fail or refuse to furnish such receipt and affidavit and the Contractor certifies to such failure or refusal, then no payment will be allowed on account of work, labor, supplies, or materials furnished by such Subcontractor or Supply Contractor.

207.05 PAYMENTS WITHHELD

a. In addition to the Retained Amount provided for in the Special Conditions, the Owner may withhold such amounts from any payment as may be necessary, for protection from loss on account of:

(1) defective construction not remedied or the cost of defective construction remedied by the Owner,

(2) claims filed or reasonable evidence indicating probable filing of claims,

(3) failure of the Contractor to make payments promptly to its own employees or to Subcontractors for materials or labor within a reasonable time after the Contractor has received the material or labor for incorporation into the Work,

(4) a reasonable doubt that the Contract can be completed by another contractor for the balance then unpaid,

(5) damage to another contractor or subcontractor,

(6) bankruptcy, receivership or insolvency of, or the pendency of such proceedings against the Contractor,

(7) costs of the Owner for engineering or other work as provided in the Contract Documents to be reimbursed to the Owner by the Contractor,

(8) failure of the Contractor to complete any part of the Work in accordance with the Construction Schedule,

(9) failure of the Contractor to furnish a satisfactory Construction Schedule or estimates of progress as required by Section 206, and

(10) credits refused by the Contractor for Construction deleted.

207.06 ACCEPTANCE AND FINAL PAYMENT

a. When the Contractor has completed the Work in accordance with the terms of the Contract Documents and all construction has operated satisfactorily for not less than the 15 days after completion, the Contractor shall submit to the Owner a Contractor's Final Request for Payment, Statement Concerning Claims, Release and Waiver of Liens and such other completed documents as may be required by the Owner for the release of any monies held.

b. The Contractor's Final Request for Payment shall be prepared on the basis of the Contract, including all authorized Change Orders, but not inclusive of Bids or claims of the Contractor which have not been accepted by executed Change Order. The Contractor's Final Request for Payment shall constitute a waiver of all claims by the Contractor except for unsettled claims specifically stated in the Contractor's Statement concerning claims.

c. The Statement Concerning Claims shall warrant that the Contractor has fully completed the performance of the Contract and has fully paid for all labor, materials, equipment, services, taxes and all other costs and expenses of every nature and kind whatsoever resulting from the Contract. If any dispute exists between the Contractor and any person, partnership or corporation to which the Contractor might be obligated in connection with the Contract, the Contractor shall state the name of the claimant, the amount and the general nature of the claim against the Contractor. Such Statement Concerning Claims shall so state the amount and nature of all present and future claims that the Contractor may have against the Owner relative to the Contract in addition to the Contractor's Final Request for Payment.

d. Upon receipt of the Statement Concerning Claims, Release and Waiver of Liens, Contractor's Final Request for Payment, and any other documents necessary for the release of monies held the Owner will, within a reasonable time, take action on the Contractor's Final Request for Payment and on acceptance of construction. Such action shall be subject to the conditions of the Performance and Labor and Material Payment Bonds, legal and contractual rights of the Owner, required warranties, and correction of faulty construction after final payment. The Owner shall have the right to retain from any payment then due the Contractor, so long as any bills or claims remain unsettled and outstanding, a sum sufficient, in the opinion of the Owner, to provide for the payment of the same. It is also understood and agreed that, in the event of any breach by the Contractor of the provisions

hereof, the Owner may retain from any payment or payments, which may become due hereunder, a sum sufficient, in the opinion of the Owner, to compensate for all damages occasioned by such breach, including any damages arising out of delay on the part of the Contractor.

e. By proper action of its governing body, the Owner may act relative to the acceptance of construction. No official, employee, agent or representative of the Owner, with the exception of the governing body empowered to authorize execution of the Contract, shall have the power to accept construction.

f. Acceptance of construction will be evidenced by a Notice of Acceptance of Construction in writing signed by a duly authorized official of the Owner in the manner provided for written notices. No other act of the Owner shall constitute acceptance of construction.

g. 30 days after the Owner has accepted the construction, the Contractor may submit a Request for Payment of the Retained Amount; provided, however, that the Owner may also retain such additional amounts and for such lengths of time as may be required by law or by the Special Conditions. If any liens remain unsatisfied after payment of the Retained Amount is made, the Contractor shall immediately reimburse the Owner such amounts as the Owner may have been compelled to pay in discharging such liens including all costs and reasonable attorney's fees.

207.07 CONSTRUCTION FURNISHED PRIOR TO NOTICE TO PROCEED

Notwithstanding any other provision of the Contract, the Owner shall not be obligated to accept or to pay for any construction furnished by the Contractor prior to delivery of Notice to Proceed whether or not the Owner has knowledge of the furnishing of such construction.

207.08 SALES AND SIMILAR TAXES

Prices provided for in the Contract Documents are exclusive of Sales or Use Taxes for the reason that the Owner is, by law, exempt from such taxation. The Contractor shall be appointed an agent of the Owner for the purposes of making tax-exempt transactions in the performance of the Contract. In the event, however, a change in law effectively results in the cancellation of such agency, then in that event the Owner will reimburse the Contractor for monies expended directly on such taxes covered by the agency appointment. The Contractor shall provide proof of payment of taxes and shall file appropriate claims in accordance with the payment article of the Contract.

The Contractor shall be responsible for payment of any other applicable taxes or governmental charges.

207.09 CREDIT

In the event construction is deleted or modified, or specified material, equipment, method or process is substituted which results in a reduction in cost, the Owner shall be entitled to a credit in an amount equal to such reduction or such other negotiated amount as to which the Owner might agree.

PART 2 - GENERAL CONDITIONS

SECTION 208 - ADDITIONAL REQUIREMENTS FOR GENERAL CONSTRUCTION

208.01 PRECONSTRUCTION CONFERENCE

Before the Contractor begins Work at the Project site, a conference will be held at a time and place determined by the Owner to review the preliminary Construction Schedule required by Section 206, to review procedures for handling submittals and communications, to set forth the responsibilities and authority of key personnel and to discuss permits, utility interferences and other special considerations relating to the Contract.

208.02 OWNER'S OPERATIONS

The Contractor shall schedule all construction so as not to interfere with the operations of the Owner. Where such interference is essential to prosecution of the Work, special arrangements shall be made and the written consent of the Owner as to time and method obtained 48 hours in advance of construction.

208.03 OWNER'S CONSTRUCTION

In connection with the Project the Owner reserves the right to furnish construction which is not included in the Contract by the Owner's forces, the service forces of operating utilities or the forces of other contractors.

208.04 OTHER CONTRACTS

a. The Contractor shall ascertain to its own satisfaction the scope of the Project and the nature of any other contracts that have been or may be entered into by the Owner in the prosecution of the Project, so that the Contractor may perform the Contract in coordination with such other contracts, if any. Nothing herein contained shall be interpreted as granting to the Contractor exclusive occupancy of the project site. The Contractor shall not cause any unreasonable hindrance or delay to any other contractor working on the Project site. If, in the opinion of the Owner the performance of the Contract is likely to be interfered with by the simultaneous performance of some other contract or contracts to which the Owner is a party or by the Owner's own forces, the Owner is not obligated to decide which contractors shall cease a part or all of their construction temporarily and which contractors shall continue, or whether the construction under all contracts can be coordinated so that all contractors may proceed simultaneously. The Owner shall not be responsible for any delays or damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the performance, failure to

perform, or attempted performance by any other contractor or any other contract.

b. The Contractor shall give other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their construction at the Project site and shall properly connect and coordinate its construction with theirs. If other contractors are working in the same area, with equal rights and privileges, it shall be the responsibility of the Contractor to make whatever arrangements with said other contractors as are necessary for the proper execution and coordination of construction.

c. If any part of the Contractor's construction depends upon the construction of any other contractor for proper execution or results, the Contractor shall inspect the other contractor's construction, and at least 10 days prior to the time the Contractor begins construction on such part, report to the Owner in writing any defects in such other contractor's construction that renders it unsuitable for such proper execution and results. Failure on the part of the Contractor to so inspect and report shall constitute an acceptance of the other contractor's construction as fit and proper for the reception of the Contractor's construction, except as to defects which may subsequently develop in the other contractor's construction.

d. The Contractor agrees to save the Owner harmless from any claim, suit or demand of any other contractor by reason of the failure of the Contractor to conform with the Construction Schedule.

208.05 LANDS BY OWNER

Unless otherwise provided in the Special Conditions, the Owner will provide only the lands upon which the construction under the Contract is to be located, together with the right-of-access to such lands. The Contractor shall confine its equipment, storage of materials, and construction operations to such limits as may be directed by the Owner, and shall not unreasonably encumber the premises with its materials.

208.06 LANDS BY CONTRACTOR

The Contractor shall provide at its own expense and with no liability to the Owner any additional lands, and access thereto, not shown or described in the Contract Documents that may be required for temporary construction facilities, storage areas, borrow areas and spoil areas. The Contractor shall confine its equipment, storage and other operations to those areas described in the Contract Documents and such additional areas as it provides at its own expense.

208.07 EMPLOYEES

The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ or continue to employ on the Project anyone not skilled in the work assigned or any person unsatisfactory to the Owner. Neither the Owner nor the

Contractor shall offer employment to any employee of the other party, or to any employee of another contractor to the other party, without the consent of the other party first having been obtained.

208.08 PROJECT SAFETY

a. The Contractor shall exercise all reasonable precautions for the safety of its employees and of the general public and of the Owner's employees, and shall comply with all applicable provisions of federal, state, and municipal safety laws, building and construction codes and the safety rules and other regulations of the Owner, including, but not limited to, the requirements of the U.S. Occupational Safety and Health Administration (OSHA) or applicable State statutes in lieu thereof. The Contractor shall also comply with the recommendations in the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America insofar as applicable, unless such recommendations are incompatible with federal, state, or municipal laws or regulations. Monthly reports of all lost-time accidents shall be promptly submitted to the Owner and shall include such data as are requested by Owner.

b. The Contractor shall enforce all instructions of the Owner regarding signs, advertising, fires, danger signals, barricades and smoking and shall require all persons employed on construction to comply with all building, post or institutional regulations while on the premises. The Contractor shall require all employees to be familiar with and comply with the Owner's safety regulations. The Contractor shall not permit any part of any structure to be loaded in excess of its maximum allowable loading or in a manner that will otherwise jeopardize its safety or the safety of adjacent property.

c. The Contractor shall provide adequate signs, barricades, signal lights, and watchmen and shall take all necessary precautions for the protection of construction and the safety of the public. All barricades and obstructions shall be protected at night by satisfactory signal lights which shall be kept lighted from sunset to sunrise. Barricades shall be of substantial construction and shall be painted white to increase their visibility at night.

d. The Contractor shall at all times so conduct its work as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the Project, and to ensure the protection of persons and property in a manner satisfactory to the Owner. No road or street shall be closed to the public except with the permission of the Owner and the proper governmental authority.

e. The Contractor shall be responsible for safety on the Project site directly related to the construction project, including, but not limited to, providing or assuring a safe place for the performance of construction, methods of construction used by any contractor employed subcontractors, suppliers or other entities or their partners, officers, agents, employees or servants, and

for compliance of the Project site and construction with applicable local, state and federal health and safety laws and regulations. All access for Contractor personnel or Contractor employed sub contractors or vendors shall be coordinated through Owner's plant management staff.

208.09 INSTRUMENT SURVEYS

a. The Owner will furnish the instrument surveys necessary to establish certain bench marks, base lines and property boundaries specifically noted on the Contract Drawings and such construction surveys, if any, as are specifically described in the Special Conditions. From the information provided by the Owner, the Contractor shall develop and make such additional detailed surveys as are needed for construction, such as slope stakes, batter boards, stakes for pile locations and other working points, lines and elevations.

b. All bench marks, base lines, and property boundaries, as originally established by the Owner, shall thereafter be maintained by the Contractor who shall be responsible for maintaining their accuracy and who shall pay to the Owner the reasonable cost to the Owner of their establishment if they are disturbed. The Contractor shall notify the Owner in writing at least 10 days in advance of the time the Contractor will begin work on any part of the Work requiring surveys to be furnished by the Owner.

c. The Contractor shall provide reasonable and necessary opportunities and facilities to the Owner for setting points and making measurements during construction.

208.10 PROTECTION OF PROPERTY

a. The Contractor shall continuously maintain adequate protection of all its construction, the Owner's property and the adjacent public and private property from damage, injury, or loss arising from construction. The Contractor shall pay for any damage, injury or loss resulting from lack of adequate protection.

b. The Contractor shall not enter upon public or private property for any purpose without obtaining permission from the proper public authority or private property owner. Construction on state highways, county roads, or any public right-of-way shall meet the requirements of the authority having jurisdiction over such right-of-way. It shall be the Contractor's responsibility to notify said authority before beginning construction on right-of-way, and to ascertain that the schedule of operations proposed is satisfactory to the authority.

c. Wherever construction under the Contract is undertaken on easements or rights-of-way over private property, or public right-of-way or franchise, all construction operations shall be confined to the limits of such easement,

right-of-way or franchise and be completed so as to cause the least amount of disturbance and minimum amount of damage.

d. Construction across public or private property shall be carried out in one continuous operation with immediate restoration and cleanup of the construction area. If the Contractor should fail to perform such construction, restoration and cleanup continuously, the Owner may give the Contractor a written notice to do so. In the event of failure by the Contractor to complete such construction, restoration and cleanup within 5 days after receipt of such notice, the Owner may complete same to the extent the Owner deems advisable. The cost of all labor, material, supervision and other expenses incurred by the Owner in so doing shall be paid by the Contractor to the Owner and if not paid, shall be deducted from any payments due the Contractor under the Contract.

e. The Contractor shall protect and maintain all underground or above ground utilities and structures affected by its construction and all lawns, shrubs, trees, fences and other improvements on property crossed by or adjacent to its operations, and shall repair and restore in a satisfactory matter at its expense all damage resulting from the Contractors' operations. The Contractor shall be responsible for all damages caused by its construction to roads, highways, ditches, walls, bridges, culverts, utilities, barricades, lights or other property, whether such damage be at the Project site or elsewhere, and the Contractor shall repair or replace at its own expense all such damage in a satisfactory manner.

f. It is expressly understood that the Contractor shall restore all easement and right-of-way property to a condition equal to its original condition. Before beginning construction the Contractor shall file with the Owner properly identified and dated photographs of such property as may be designated on the Contract Drawings or described in the Special Conditions.

208.11 CUTTING AND PATCHING

The Contractor shall at its own expense do all necessary cutting and patching of its construction that may be required in order to properly receive the construction of other contractors on the Project or as required by the Contract Documents. The Contractor shall restore all such cut or patched construction to a condition satisfactory to the Owner. The cost resulting from replacement of defective cutting and patching of construction shall be borne by the Contractor.

208.12 CLEANUP

At the time of termination or suspension for an extended period of all or any portion of the Work, or at Completion but before final acceptance by the Owner, the Contractor at its own expense shall remove from the Owner's property and from all public and private property all of its equipment and unused materials for which the Owner has made no payment, temporary structures, rubbish and waste materials resulting from its operations

and shall leave the Project site in a neat and orderly condition satisfactory to the Owner. The Contractor shall at all times during the progress of construction maintain the site in as neat and orderly a condition as construction operations will permit. In the event the Contractor fails to do so, the Owner may remove and store such equipment and unused materials and dispose of rubbish and waste at the expense of the Contractor. The cost of such removal, storage, and disposal will be deducted from any payments due the Contractor under the Contract.

208.13 SANITARY PROVISIONS

The Contractor shall furnish and maintain for all workmen employed on the Project temporary toilet facilities of a type, number and location satisfactory to the Owner and all public authorities having jurisdiction. The Contractor shall maintain the same in a sanitary condition from the beginning of the Work until Completion and shall then remove the temporary toilet facilities and disinfect the premises.

208.14 INDEX OF ACCOUNTS

Prior to final payment and at the option of the Owner, the Contractor shall furnish to the Owner a complete accounting of the actual costs of labor, materials and other charges, together with all required documentation, in accordance with the Index of Accounts specified in the Special Conditions.

208.15 EXISTING UTILITIES AND IMPROVEMENTS

a. The Contractor shall remove such existing improvements on the Project site as may be necessary for the execution of the Work and, unless otherwise specified in the Special Conditions, shall rebuild the existing improvements in as good a condition as found; provided that existing improvements which interfere with performance of the Work shall be maintained by the Contractor until their removal is authorized or directed by the Owner.

b. The Contractor shall make all necessary arrangements and do all things required to avoid interference with the maintenance and operation of power, telegraph, telephone, water, sewer, gas and other utility lines, properties, and facilities of every kind, all in a manner satisfactory to the owners and operators thereof.

c. If construction under the Contract crosses highways, railroads, streets, or other utilities under the jurisdiction of states, counties, cities, or other public bodies, public utilities, or private entities, the Contractor shall secure written permission from the proper authority before proceeding with such construction. A copy of this written permission shall be filed with the Owner before any construction is begun. The Contractor shall furnish written releases from the proper authorities before final acceptance of construction by the Owner.

d. Existing utilities indicated on the Contract Drawings have been plotted from information currently available to the Owner. The source of information generally consists of construction record drawings and data obtained verbally from officials associated with the particular utility. The data are shown on the Contract Drawings for whatever benefit the Contractor may derive, and, unless specific instructions or data concerning certain utilities are set forth in the Special Conditions, the data shown on the Contract Drawings shall not necessarily be considered precise or complete, and the Owner makes no guarantee as to completeness, precision or dimensions. This shall in no way relieve the Contractor from its responsibility for maintenance of existing utilities and performance of the Contact. Under no circumstance will errors or omissions in location of existing utilities or improvements whether they be visible from the surface, buried or otherwise obscured, be considered as a basis for additional compensation to the Contractor.

e. The contractor shall be responsible for all damage to existing facilities during construction and shall restore all damaged facilities to their original condition to the satisfaction of the Owner at no cost to the Owner.

f. The Contractor shall excavate at all points of connection to existing utilities prior to beginning installation of any portion of the new utilities. The Contractor shall excavate at all points of intersection of new utilities with existing utilities that are shown on the Contract Drawings or whose location can be readily determined in the field prior to beginning installation of new facilities. Excavation shall be to the extent necessary to expose the existing utilities to determine where a conflict in routing or elevation exists between the new and existing utilities.

PART 3 - SPECIAL CONDITIONS

SECTION 306 - STANDARD FORMS

306.01 USE OF STANDARD FORMS

The forms included in the following pages have been developed to facilitate the administration of this Contract. The Contractor shall use these forms for the initiation of all correspondence or action with the Owner. If no form is applicable to the problem being presented, the Contractor shall so advise the Owner.

Copies of these forms are available in quantities necessary for administration of this Contract at the office of the Owner.

PROGRESS PAYMENT

Contractor's Application for Payment No. _____

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE..... $ _____

2. Net change by Change Orders..... $ _____

3. Current Contract Price (Line 1 ± 2)..... $ _____

4. TOTAL COMPLETED AND STORED TO DATE
(Column F on Progress Estimate)..... $ _____

5. RETAINAGE:

a. X _____ Work Completed..... $ _____

b. X _____ Stored Material..... $ _____

c. Total Retainage (Line 5a + Line 5b)..... $ _____

6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... $ _____

7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... $ _____

8. AMOUNT DUE THIS APPLICATION..... $ _____

9. BALANCE TO FINISH, PLUS RETAINAGE
(Column G on Progress Estimate + Line 5 above)..... $ _____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

STATEMENT CONCERNING CLAIMS

The Contract under that certain agreement dated _____ by and between _____ Contractor and _____, Owner, states, represents and warrants that Contractor has fully completed all construction included in the Contract and all authorized Change Orders thereto, and has fully paid for all materials, equipment, supervision, labor, services, taxes, use of equipment, and all other costs and expenses of the construction and that there are no disputes, claims or liens against the Owner, the Contractor, or any Subcontractor of Contractor, and that the Contractor will have no claims against the Owner of any kind whatsoever arising from or growing out of the Contract except as follows:

Claimant	Description of Claim	Amount

_____
Contractor

By _____

STATE OF)
) SS
COUNTY OF)

_____, being first duly sworn, on oath deposes and states, that he is the _____ of the aforesaid Contractor, that he makes this affidavit for and on its behalf and is authorized so to do, that he has read the foregoing Statement Concerning Claims and has personal knowledge of the facts contained therein and acknowledges said Statement Concerning Claims to be the free and voluntary act and deed of the Contractor for the purpose of obtaining final payment under the Contract described herein, that he was authorized to execute the same for and on behalf of the Contractor and that said Statement Concerning Claims is true and correct.

_____

SUBSCRIBED and SWORN to before me this _____ day of _____, 20__.

_____
NOTARY PUBLIC in and for the
State of_____
residing at _____.

My Commission Expires _____

RELEASE AND WAIVER OF LIENS

With reference to Contract No._____ dated _____ , 20___,

as amended, between the undersigned Contractor _____

_____and_____
(name of Contractor) (Owner)
for _____
(Project)
at
_____
(location of Owner's premises)

the Contractor hereby certifies that it has made full payment of all costs, charges and expenses incurred by it or on its behalf for work, labor, services, materials and equipment supplied to the foregoing premises or used in connection with its performance under said Contract.

The Contractor further certifies that to its best knowledge and belief, each of its Subcontractors and material men has made full payment of all costs, charges and expenses incurred by them or on their behalf for work, labor, services, materials and equipment supplied to the foregoing premises or used by them in connection with said Contract.

In consideration of $_____ as final payment, the Contractor here remisses, releases and forever discharges

_____
(Owner)

its premises and property, from all bills, liens and claims of every nature arising out of or in connection with the performance of said Contract and any amendments thereto, except as set forth in the Contractor's Statement Concerning Claims.

The foregoing shall not relieve the Contractor of its obligations under the provisions of said Contract, as amended, which by their nature survive Completion of the Work including, without limitation, warranties, guarantees and indemnities.

Executed this _____ day of _____ , 20____.

By_____

Title_____

CHANGE ORDER No. _____

Date_____ C.O. No._____

Contract Title _____ Contract No. _____

Basis for Change
(Contractor shall attach explanation for requested change in Contract.)

Contractor Amount

Original Total Contract Amount ..... $ _____

Net Amount from Previous Change Orders ..... $ _____

This Change Order Amount ..... $ _____

New Total Contract Amount ..... $ _____

Time for Completion

Original Completion Date ..... _____

Net Time Extension from Previous Change Orders... _____

This Change Order Extension ..... _____

New Completion Date ..... _____

1. Accepted By:

_____
Contractor

_____
Signature

_____
Title Date

2. Recommended for Approval By:

Guernsey

_____
Signature

_____
Title Date

3. Approved by:

Oklahoma Municipal Power Authority

_____
Signature Title Date

PART 3 - SPECIAL CONDITIONS

SECTION 307 - SPECIFICATIONS FOR CONSTRUCTION

307.01 SCOPE OF WORK

The work to be done includes the furnishing of all necessary material, labor, tools, equipment, supplies and miscellaneous items required for the complete construction of the Oklahoma Municipal Power Authority Ponca City Generating Station GSU1 Replacement Project Construction, all in accordance with the Contract Drawings and the Ponca City Generating Station GSU1 Replacement Project Construction technical specifications.

307.02 MATERIALS

The materials required for this Contract may be furnished by the Owner.

In the event materials are provided by Owner, it is anticipated that the majority of the material and equipment provided by the Owner will be delivered after the Contractor has started construction. The material and equipment will be in the custody and under the control of the Owner until it is transferred to the custody of the Contractor for use on the project. The Contractor will be considered to have custody of material on his vehicles, material in a building or enclosure owned, leased or rented by the Contractor, and material distributed or installed by the contractor at work locations on the project which have not been formally accepted as complete by the Owner.

307.03 DRAWINGS

The Drawings and Specifications collectively show the specifications of the material and equipment shown thereon. The drawings and detail specifications are made a part of these Contract specifications. The Contractor shall make a thorough examination of the Drawings and shall be responsible to detect any conflicts.

307.04 PROGRESSION OF WORK

As noted in the Contract, it is the responsibility of the Contractor to thoroughly examine the Specifications, the Drawings, and the Project site. The Contractor is expected to submit a bid based on his reputation, past performance record, and good faith by the Owner that the Contractor can successfully and skillfully complete the required work. Based on the professional skill of each qualified Contractor, the Owner expects a thorough understanding of the specifications and drawings so that each Contractor may include sufficient funding in each unit at the time of bid so as not to endanger the Contractor's profit at a later date. Each Contractor is expected to skillfully plan and

coordinate his labor and material and anticipated contingencies. Each Contractor is responsible to assure that Subcontractors and Suppliers have a clear understanding of the scope of work. The Owner will not pay any extra charges for remobilization by the Contractor or his Subcontractors.

The progression of work to timely complete construction and energize the Project shall be the responsibility of the successful Contractor. The Contractor shall provide sufficient qualified staff and equipment to perform construction at a rate which assures timely completion of the contract.

The contract price as stated by the Contractor in the Contract shall be inclusive for satisfactory and comprehensive Completion of all the project. Escalated charges for equipment, labor, testing, etc., resulting from any contingencies or delays are the responsibility of the Contractor.

307.05 LIQUIDATED DAMAGES

It is the intent of the Owner that the Contractor shall perform all of the work necessary to complete the GSU1 Replacement Project Construction as specified in this Contract Section 307.04. The Contractor agrees to pay the Owner liquidated damages in the amount of $500.00 per day of each day beginning April 1, 2018 to and including the day the Contractor completes the specified work on the GSU1 Replacement Project Construction. The Contractor will not be charged for late days attributed to an "Act of God" (such as floods, tornadoes, etc.).

307.06 EXCEPTIONS

Details of any exceptions taken to any part of these specifications shall be documented on a separate sheet to be attached to your submitted bid. If no exceptions are taken, so state on said separate sheet.

DETAILED SPECIFICATIONS

GENERAL

1. The attached detailed specifications provided by Owner's Engineer supplement the description of construction units and are included as a part of the contract.

2. These specifications are considered correct; however, the successful Bidder will be required to provide a complete and workable scheme regardless of any omissions or discrepancies in these specifications at no additional cost to the Owner.

3. The Contractor shall correct promptly all errors in equipment discovered in the field at no cost to the Owner.

4. Any details not specifically covered shall be subject to the judgment of the Owner. In the event of conflicting requirements between the above standards and these Specifications, the terms of these Specifications shall apply.

INSPECTION

1. The Owner may appoint Inspectors whose duty it shall be to see the work, including tests of equipment, is done properly and in accordance with these specifications. Inspectors shall have full access to the work and shall have authority, subject to final decision of the Owner, to condemn and reject any defective work or material.

OKLAHOMA MUNICIPAL POWER AUTHORITY
Ponca City, Oklahoma

GSU 1 REPLACEMENT PROJECT
PONCA CITY GENERATING FACILITY

CONSTRUCTION CONTRACT

SPECIFICATIONS FOR INSTALLATION AND MATERIALS
(Including Bidding Documents and Materials Contract)

NAME

ADDRESS

Project No. OK04634-047

SEPTEMBER 2017

OKLAHOMA MUNICIPAL POWER AUTHORITY
Edmond, Oklahoma

GSU 1 REPLACEMENT PROJECT
PONCA CITY GENERATING FACILITY

CONSTRUCTION CONTRACT

SPECIFICATIONS FOR INSTALLATION AND MATERIALS
(Including Bidding Documents and Materials Contract)

September 2017

Project No OK04634-047

C. H. GUERNSEY & COMPANY
Engineers • Architects • Consultants
Oklahoma City, Oklahoma

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SPECIFICATIONS FOR CONSTRUCTION

SECTION 1 SCOPE OF WORK

The work covered by this contract embraces the complete construction of one substation, one transmission line, or other major facilities as specified in the Acceptance Section, any omissions, or discrepancies notwithstanding. All material furnished by the Bidder shall be new and in conformance with these **Specifications for Construction**. There was no attempt to mislead or hide information from the Contractor during this project document development. It shall be the Contractor's responsibility to provide a workable, practical, and acceptable scheme as agreed by the Engineer. Any omissions from these specifications do not alleviate the Contractor from providing said workable, practical, and acceptable scheme at no additional cost to the Owner. All construction work shall be done in a thorough, skillful, and competent manner in accordance with the Plans, Specifications for Construction, and Project Drawings. Deviations are not permitted from these Plans, Specifications for Construction, and Project Drawings; except upon the written permission of the Engineer or Project Manager.

A Mandatory Pre-Bid meeting will be held September 28, 2017 at 10:00 a.m. at the Ponca City Generating facility, 1420 North Union, Ponca City, Oklahoma 74601

Each Bidder is strongly encouraged to visit the substation site, transmission line and general area for review prior to submitting a construction bid package on this project.

SECTION 2 MATERIALS

It is the intent of these specifications that insofar as materials required are included in the Rural Electrification Administration's "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers," only such materials are both furnished and installed in the build out of this project. In the event that any materials are required beyond the scope of the "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers," specifications for such materials will be included on the drawings or in a supplement to these specifications.

The Contractor is both completely and solely responsible for the timely issuance of purchase orders and the timely delivery of all Contractor-Furnished Material as specified and as quoted by the Contractor at time of bid. The Contractor shall review all material and drawings to assure a workable and acceptable scheme as determined by the Engineer and shall aggressively pursue expediency of all Contractor-Furnished Material. These Contractor-Furnished Materials shall include but not limited to the following: engineered fill material, crushed rock, concrete, rebar, fence, conduits, cables, galvanized steel, insulators, tube bus, and appropriate fittings.

There are Owner Furnished Materials (OFM) to install which may include but are not limited to the following: group-operated-air-break-high-voltage switches, steel, insulators, bus tubing, conductor, control cabinet, relays, power transformer, station service transformer, power circuit breakers, etc., which the Contractor shall consider and contain within the project work plan with time, incidental materials, and labor.

SECTION 3 DRAWINGS

The Drawings and Specifications collectively show the specifications of the material and equipment shown thereon, and include schedules of conduit, cable and other items not readily ascertained from either the representative drawings or specifications. Such schedules show the quantities, sizes, types and other pertinent information, method of installation, and construction details are both indicated and clearly shown. The drawings and specifications in the attached List of Drawings are an integral part of these contract specifications. The Contractor shall make a thorough examination of the Drawings, Specifications, Schedules, and shall be responsible for and required to detect any conflicts.

SECTION 4 DESCRIPTION OF CONSTRUCTION UNITS

Each Construction Unit represents a complete installation of the designated portion of a complete substation as specified on the drawings, together with connections to associated equipment and each related integrated interconnection. Each Construction Unit represents all labor and material, including necessary accessories completely installed and tested in satisfactory operation, except where specifically stated otherwise. Each Construction Unit shall be deemed to include any minor part associated with it, and which is necessary for the complete installation and proper or Owner accepted operation of the Construction Unit. Installation of the Construction Units shall include all necessary handling, assembling, testing, and any and all other work necessary to complete the Project in accordance with these Specifications. Connecting materials within the substation, except where otherwise specified, shall be deemed to be included with the smaller of the units to which connected. Full identification of each Construction Unit and all necessary specifications of the installation shall be as shown on the drawings. Items of material in each Construction Unit shall be of the designated size, rating, type, voltage, or other specification in accordance with the drawings.

All items of equipment, unless otherwise specified, are mounted on a structure, which shall be a Construction Unit of Group A. Some, not necessarily all of those otherwise specified items are contained within a control cabinet.

A letter of the Group to which an individual Construction Unit belongs as indicated with a unique identifying item number. Items of equipment designated by the Construction Unit in one substation or transmission line or other major facilities shall be of only one kind as to voltage, type, or other specifications. The bid sheet for each substation or transmission line or other major facilities shall be prepared separately from other substations or transmission line or other major facilities and shall contain all unit prices for Construction Units contained in the substation or transmission line or other major facilities. In all cases, the "Name and Description of Construction Unit" column of the Bid Sheets shall contain sufficient information to identify the Construction Unit whether furnished by Contractor or Owner.

SECTION 5 CONSTRUCTION POWER

The Contractor is responsible for obtaining construction power of 120/240 volts or whatever voltage his equipment requires. The Contractor will be required to supply his own generator for construction power. The Contractor shall furnish and install all necessary temporary wiring and

branch circuit protection per OSHA, NEC, and NESC Standards plus any additional requirements from the source of supply as he has determined is required for his work.

SECTION 6 UTILITIES

a. Contractor(s) shall furnish their own material storage facility at the construction site. Storage facilities shall be adequate for storing materials in a fashion as approved by the material manufacturer and in areas approved by the Owner.

b. Contractor(s) shall furnish their own telephone service at the construction site. A cellular or portable telephone is acceptable.

c. Contractor(s) shall furnish their own computer and e-mail service at the construction site. Any cell phone, digital tablet, desk top, laptop, or portable computer is acceptable provided e-mail, photographs, and other attachments are easily and reliably sent and received.

d. Contractor(s) shall furnish their own digital camera at the construction site to create photographs to e-mail to Engineer and Owner.

e. Contractor(s) shall furnish their own potable and construction water at the construction site. The Owner of the construction site will provide no water of any type or purity.

f. For human necessity and comfort, Contractor(s) shall furnish and maintain restrooms at the construction site for the duration of each of these stages of site development: site staking, site preparation, grading, construction, final checkout, and commissioning of the substation. Upon Owner acceptance of the completed and commissioned substation, then the Contractor shall remove the portable restroom facilities.

SECTION 7 OWNER FURNISHED MATERIAL

a. The Owner will furnish the material as listed in the contract. All hardware, bolts, nuts, washers, connectors, and other miscellaneous equipment not listed on Owner-Furnished sheet, then the Contractor shall furnish.

b. Contractor(s) shall securely load, safely haul, and unload all Owner-Furnished Material that is not shipped directly to the substation site by the manufacturer, regardless of who ordered the material whether Contractor or Owner. Contractor(s) shall securely and safely unload all Material shipped directly to the substation sites by its manufacturer unless previous arrangements are made with that manufacturer for it to responsibly unload the item(s).

c. Due to Owner-Furnished Materials, the Contractor shall inventory all material as well as that ordered by Bidder, upon receipt and denote any missing or damaged material regardless of severity at the time of receipt of the material. Included in the disposition is a timely notice to Owner, Engineer, and Manufacturer within a day of discovery. The Contractor shall also inventory all existing material removed from the project and denote any missing or damaged material units at

the time of delivery to the Owner. Included in this denotation for returned material is a required written notice to Owner or its designee.

SECTION 8 CONSTRUCTION SCHEDULE

The Contractor shall furnish a construction schedule indicating projected material delivery and his predetermined work dates for all unit items for the substation. The Contractor shall furnish in his bid documents his construction schedule to both the Owner and the Engineer.

SECTION 9 SUBSTATION LAYOUTS

The Contractor shall have complete responsibility for the staking as required to achieve the demolition, site preparation, grading, layout and foundation elevation as shown on the plans. The Owner, in accordance with these plans, shall furnish the Contractor the elevation bench mark and property corners. The Owner or his designee will verify the grade elevations, layout, and assist the Contractor to determine such, but will not relieve the Contractor of any obligations as to proper alignment of finish grade, layout, foundation alignment, anchor bolt settings, and structure fitting its function.

SECTION 10 PROGRESSION OF WORK

As noted in the Substation Erection Contract, it is the responsibility of each Contractor to examine thoroughly the specifications, the drawings, and the substation sites. Each Contractor is selected to submit a bid based on his reputation, performance record, and good faith by the Owner that any of the Bidders can both successfully and skillfully complete the required work. Based on the professional skill of each qualified Bidder, both the Owner and Engineer expect a thorough understanding of the specifications and drawings so that each Bidder may include sufficient funding in each unit at the time of bid so as not to endanger the Contractor's profit at a later date. Each Contractor is expected and required to skillfully plan and coordinate his labor, material, and anticipate contingencies. Each Contractor is responsible to assure that Sub-Contractors and Suppliers have a clear understanding of scope of work and project completion timeliness. The Owner will not pay any extra charges for remobilization by either the Contractor or the Subcontractors.

The contract price as stated by the Contractor in the Contract shall be inclusive for satisfactory and comprehensive completion of the projects. Escalated charges for equipment, labor, testing, etc., resulting from any contingencies or delays are the responsibility of the Contractor.

SECTION 11 SAFETY AND OUTAGES

It is the intent of this section to provide a safe work environment for all who are on the construction sites from initial development to final commissioning of the energized substation.

a. This Construction Contract may include work within the proximity of energized circuits. The work shall be in accordance with OSHA, NEC, NESC, construction best work practices, and the following:

   (1) Perform no work on energized circuits, buses, lines, etc. Perform no work without the use of acceptable grounding chains on allegedly de-energized

sections. Verify each section by testing dead, and then ground each work location per best construction work practices.

(2) Perform no work of any type within any substations without a qualified Construction Contractor Superintendent on site at all times.

(3) Close and lock all gates when personnel leave or vacate the site at any time or for any reason.

(4) Required is a "tailboard" discussion or meeting conference at the beginning of each workday at each jobsite. All personnel working at the jobsites **must** attend including sub-contractors. The Contractor's qualified Superintendent shall call, preside, lead, and end, these meetings. All hazards related to that day's work shall be addressed at each meeting. The Owner or his designee will attend and participate in each meeting at their discretion. The Contractor's qualified Superintendent shall be responsible for notifying all persons not available for the "tailboard" conference of hazards upon those persons entering the jobsite.

(5) Rope off any and all energized sections with a brightly colored marked either "Caution," "Energized," or "Warning" tape or rope and all personnel on site shall be kept informed by the Contractor's qualified Superintendent of which sections are energized.

(6) Hard hats, safety glasses, and steel-toed shoes respectively required to be properly atop of each cranium, covering each eye, and upon each foot at all times as part of personnel protection equipment (PPE) while on site.

(7) Compliance with OSHA, NESC, NEC, construction best work practices, and other applicable work methods, safety rules, and related best practice industry standards is required.

(8) Outages:

(a) Due to the importance of the substations and loads served, outages on switching scheduled may not be available when planned due to system conditions. The Owner will not be responsible for such unforeseen delays. Outages may be necessary at night or on weekends. The Owner will not be responsible for any Contractor's adders for overtime due to such conditions.

(b) Outages shall be requested a minimum of ten (10) days in advance and shall be kept to a minimum number and duration.

(9) The System Owner, the Substation Owner, or their designee will perform all switching operations, then that entity will issue working clearance to Contractor's qualified Superintendent.

SECTION 12 SUBCONTRACTORS

The Contractor is solely, specifically, totally, and financially responsible for Subcontractor(s) that the prime contracting firm employs. The Contractor shall examine past performance, financial stability, limitations, etc., of any Subcontractor considered, or employed for this project work. Should any Subcontractor(s) be employed, the Contractor shall maintain a qualified Superintendent employed by the Contractor's firm at all times when Subcontractor(s) is (are) on the job site. Communication will be solely between the Contractor's qualified Superintendent and the Project Manager and/or Inspector selected by the Owner. Should any Subcontractor(s) not be able to skillfully and orderly perform the work required, in the opinion of the Owner's Inspector, that Subcontractor(s) shall be replaced at the request of the Project Manager, Inspector or Owner with no cost to or recourse against the Owner. The Contractor shall be solely, specifically, totally, and financially responsible for any delays surrounding progression of the work by the prime contracting firm, or the prime firm's Subcontractor(s).

SECTION 13 MASTER SUPERINTENDENT

The Contractor shall specifically maintain one qualified Master Superintendent in charge of all project site Superintendents, Subcontractors, etc., throughout the entire course of the construction of all facilities. This Master Superintendent shall be both the Owner's and the Engineer's contact and the Master Superintendent shall disseminate information and be the liaison to the Owner, Project Manager, Engineer, and Owner's Inspector.

CONSTRUCTION ASSEMBLY UNITS

Description of Construction Assembly Units. *Each Construction Assembly Unit consists of a complete installation of the designated portion of a substation as specified on the drawings, together with connections to associated equipment. Each Construction Assembly Unit represents all labor and material including necessary accessories completely installed and tested in satisfactory operation. Full identification of each Construction Assembly Unit and all necessary specifications of the installation is shown on the drawings.*

Items of material in each Construction Assembly Unit shall be of the designated size, rating, type, voltage, or other specification in accordance with the drawings. The bill of material drawing for each substation shows the identification of the Construction Assembly Units under which the material is to be installed and shows which items of material may be partly or entirely found on the lists of Owner-furnished materials.

All items of equipment, unless otherwise specified, are mounted on a structure which shall be a Construction Assembly Unit of Group A.

Each Construction Assembly Unit is designated by the letter of the Group to which it belongs and an identifying number. The same item of equipment carries the same Construction Assembly Unit designation in all the substations. Items of equipment designated by the same Construction Assembly Unit in one substation are of only one kind as to voltage, type and other specifications. The tabulation of Construction Assembly Units for each substation is separate and contains all units necessary for construction of that substation.

Group A. Structures. *A Construction Assembly Unit consists of a structure, or structures, with bus supports including insulators and fittings, buses, conductors and overhead ground wires to adjacent structures within the substation, grounding material to connect equipment with the ground bus, and associated material including mounting brackets, supports for equipment, clamps and connectors, all as specified in the drawings.*

Group B. Three-Pole Group Operated Air Break Switches. *A Construction Assembly Unit consists of one 3-pole group operated air break switch with all accessories and operating mechanisms as specified in the drawings.*

Group C. Lightning Arresters. *A Construction Assembly Unit consists of one single arrester.*

Group D. Single Pole Disconnecting Switches. *A Construction Assembly Unit consists of one single pole disconnecting or by-pass switch as specified in the drawings. If a fuse disconnect switch is specified, the fuse is included with the switch.*

Group E. Power Circuit Breakers. *A Construction Assembly Unit consists of one complete three-phase power circuit breaker complete with supporting frame and control cabinet, unless shown otherwise in the drawings, mounted as specified in the drawings.*

Group F. **Circuit Reclosers.** *A Construction Assembly Unit consists of a complete single-phase or three phase circuit recloser as specified in the drawings.*

Group G. **Meters, Relays and Instrument Transformers.** *A Construction Assembly Unit consists of one meter, relay potential transformer or current transformer.*

Group H. **Transformers***. A Construction Assembly Unit consists of one power transformer or one station service transformer either single-phase or three-phase as specified in the drawings.*

Group I. **Voltage Regulators.** *A Construction Assembly Unit consists of one single-phase or three-phase voltage regulator as specified in the drawings.*

Group J. **Communications and Supervisory Control Equipment.** *A Construction Assembly Unit consists of carrier current equipment, microwave, or other types of communications and supervisory control equipment as specified in the drawings.*

Group K. **Conduit and Cable.** *A Construction Assembly Unit consists of the wire, cable, conduit and accessories necessary to complete the installation of equipment in accordance with the specifications and drawings, where such installation has not been included in other Groups.*

Group L. **Foundations.** *A Construction Assembly Unit consists of concrete footings and foundations except for the fence, as specified in the drawings.*

Group M. **Site Preparation.** *A Construction Assembly Unit consists of clearing, grading, drainage work, and surfacing, as specified in the drawings.*

Group N. **Fence.** *A Construction Assembly Unit consists of the complete installation of the fence, gates, etc., as specified in the drawings.*

Group O. **Station Grounding.** *A Construction Assembly Unit consists of the complete ground bus including ground rods, grounding mats or platforms, except as otherwise provided in other Groups, with connections to structures, equipment, and fence as specified in the drawings.*

Other Groups. *The Engineer shall specify such additional Groups as may be necessary for the completion of the Project. Description of these Groups shall be provided by an addition to this Part of the Specifications for Construction.*

GROUP Q. **RELAYS, METERING, AND CONTROLS.** *A construction unit under this group consists of the furnishing, installation, and testing of all relays, meters, and controls to be housed in Group P or substation yard cabinets within this project as specified in the drawings.*

GROUP S. **STATION OIL CONTAINMENT.** *A construction unit under this group consists of the furnishing and installation of the complete water/oil separation in the oil containment pit near transformer as specified in the drawings.*

GROUP T. **15 KV METALCLAD SWITCHGEAR.** *A construction unit under this group consists of the installation of the complete 15 kV metalclad switchgear.*

GROUP U. **480 V SWITCHGEAR AND MOTOR CONTROL CABINETS.** *A construction unit under this group consists of the installation of the complete 480 V switchgear and motor control center (MCC).*

GROUP V. **PROTECTION WALL.** *A construction unit under this group consists of the installation of a protection wall for the protection of the generating station.*

GROUP W. **TRANSMISSION LINE.** *A construction unit under this group consists of the installation of the transmission line connecting GSU 1 to the transmission grid.*

NOTE:

FOR BIDDING PURPOSES

All INSTRUCTION BOOKS, DRAWINGS, DIAGRAMS,

FROM MANUFACTURER, SUPPLIER, FABRICATOR

ARE TO BE FURNISHED ACCORDING TO THIS SCHEDULE:

Instruction Books	One (1) Copy to:	Four (4) Copies to:
Drawings, Diagrams, etc., (AutoCAD format)	One (1) Copy to: Or One (1) PDF Electronic File	Four (4) Copies to: Or One (1) AutoCAD Electronic File
Correspondence	One (1) to usadalge@ompa.com	One (1) to Phil.Dean@guernsey.us
	Oklahoma Municipal Power Authority (OMPA)	Guernsey
	% Umesh Sadalge, OMPA	% Phil Dean, Project Manager, Guernsey
	2701 W. I-35 Frontage Road	5555 N Grand Blvd.
	Edmond, OK 73013	OKC, OK 73112

CONSTRUCTION UNITS

GROUP A **STRUCTURES** A construction unit under this group consists of installing a structure or structures, complete with mounting brackets, stands, pedestals, or other structural items as required and as specified on the drawings, and connection of all bus supports, including insulators and fittings, buses, connectors, conductors, hardware, nameplates, switch numbers, and any substation associated material. See Detailed Specifications and Project Drawings for additional information.

UNIT A-1 69 KV STEEL STRUCTURES

This construction unit shall consist of the procurement, complete unloading, inspecting, inventory, assembly, installation, or erection of the galvanized steel structures including pedestals; equipment supports; erection bolts, washers, and nuts; all deformed bar turned anchor bolts; mounting bolts and nuts for both Owner Furnished and Contractor Furnished Materials, etc., as shown on the project drawings. The general arrangement and outlines of the structures with dimensions are on the project drawings. See Detailed Specifications and Project Drawings for further galvanized steel structure and design requirements.

UNIT A-2 15 KV STEEL STRUCTURES

This construction unit shall consist of the procurement, complete unloading, inventory, inspecting, assembly, installation, or erection of the galvanized steel structures including pedestals; equipment supports; erection bolts, washers, and nuts; all deformed bar turned anchor bolts; mounting bolts and nuts for both Owner Furnished Materials and Contractor Furnished Materials, etc., as shown on the project drawings. The general arrangement and outlines of the structures with dimensions are on the project drawings. See Detailed Specifications and Project Drawings for further galvanized steel structure and design requirements.

UNIT A-3 69 KV BUSWORK

This construction unit shall consist of the procurement, complete unloading, inspecting, inventorying, assembling, and installation of all bus, bus supports, insulators, fittings, suspension insulators, jumpers, metallic shield static wires, tubes, conductors, clamps, connectors, nameplates, and associated material as specified and as shown on the drawings. All insulators shall be ANSI-70 Gray Station Post. Conductor and tube used as shown on the drawings. See Detailed Specifications and Project Drawings for further bus and design requirements.

UNIT A-4 15 KV BUSWORK

This construction unit shall consist of the procurement, complete unloading, inspecting, inventory, and assembly, and installation of all bus, bus supports, insulators, fittings, suspension insulators, jumpers, metallic shield static wires, tubes, conductors, clamps, connectors, nameplates, and associated material as specified and as shown on the drawings. Conductor and tube used as shown on the drawings. All insulators shall be

ANSI-70 Gray Station Post. See Detailed Specifications and Project Drawings for further bus and design requirements.

GROUP B **SWITCHES** A construction unit under this group consists of one (1) 3-pole group operated air break switch with all accessories and operation mechanisms as specified in the drawings.

UNIT B-1 69 KV, 1200 A, 3-POLE GROUP OPERATED AIR BREAK SWITCH

A construction unit in this group consists of the procurement, complete inspection, assembly, installation, adjustment, testing, and operation pipe piercing of one (1) 69 kV, 1200 A, 350 kV BIL, 3-pole, group operated air break, vertical break, horizontal mount switch with all live parts, operating accessories, operating mechanism as specified for manual operation including hand crank opening/closing devices, locking provisions, and as shown on the drawings. Switch to mount on a structure as shown and specified in the drawings horizontal mount vertical break. Mechanical adjustment of jaws, blades, intra-phase piping, and operating lever(s) shall be done as directed by the supplier's representative or the Engineer. See Detailed Specifications and Project Drawings for air break switch and its design requirements.

UNIT B-2 15 KV, 1600 A, 3-POLE, GROUP OPERATED AIR BREAK SWITCH

A construction unit in this group consists of the procurement, complete inspection, assembly, installation, adjustment, testing, and operation pipe piercing of one (1) 15 kV, 1600 A, 110 kV BIL, five inch bolt circle, (5" BC),3-pole, group- operated air break vertical break horizontal mount switch with all live parts, operating accessories, operating mechanism as specified for manual operation including hand crank opening/closing devices, locking provisions, and as shown on the drawings. Switch to mount on a structure as shown and specified in the drawings horizontal mount vertical break. Mechanical adjustment of jaws, blades, intra-phase piping, and operating lever(s) shall be done as directed by the supplier's representative or the Engineer. See Detailed Specifications and Project Drawings for air break switch and its design requirements.

GROUP C. **SURGE ARRESTER** A construction unit under this group consists of one (1) single-phase surge arrester complete with terminal connectors, including grounding connector.

UNIT C-1 48 KV MCOV SURGE ARRESTER

This construction unit shall consist of the optional procurement, complete installation, inspection, and testing of one (1) single-phase, 48 KV MCOV, station class surge arrester, complete with metal cap, and line terminal suitable for 4-hole NEMA connector and No. 2 to 4/0 clamp-type connector for either copper or aluminum conductor. Mounted in horizontal configuration. This arrester shall be suitable for 69 kV operations. All arresters shall be ANSI-70 Gray Polymer-housed Station Class. See Detailed Specifications and Project Drawings for further surge suppression and its design requirements.

GROUP E. **CIRCUIT BREAKERS** A construction unit under this group consists of installation one (1) breaker as specified. See Detailed Specifications.

UNIT E-1 69 KV, 600 A, CIRCUIT BREAKER (OWNER FURNISHED)

This construction unit shall consist of the complete installation and testing of one (1) 69 kV, 600 A continuous, 40 kA interrupting rating minimum, outdoor type circuit breaker. Circuit breaker is currently in the bid process. When specific details are known, they will be forwarded to successful bidder. Drawings reflect Engineer's assumption regarding this unit. See Detailed Specifications and Project Drawings.

GROUP H. **TRANSFORMERS** A construction unit under this group consists of one (1) transformer, either single-phase or three-phase as indicated on the drawings.

UNIT H-1 16.8/22.5/30/31.4 MVA 15-69 KV GSU TRANSFORMER (OWNER FURNISHED)

This construction unit shall consist of the complete installation and testing of one (1) 16.8/22.5/30/31.4 MVA continuous capacity with ONAN/ONAF/ONAF, 55/65 degrees C temperature rise, operating at less than 3,300 feet altitude, outdoor, mineral oil filled, three phase, 60 hertz, and with No-Load Tap Changing-high side (NLTC) equipment. The transformer installation and testing is limited to external wiring to transformer whether control wiring or power connections as transformer manufacturer is to place unit on its Contractor furnished concrete pad, field dress, and field test unit. After making all connections, a complete final substation assembled test by an independent third party as determined and designated by Owner or Engineer, requires a complete commissioning test and report. This unit is Owner-Furnished. See Detailed Specifications, Manufacturer Drawings, and Project Drawings

GROUP K. **CONDUIT AND CABLE** A construction unit under this group consists of the complete furnishing, installation, and testing of wire, cable, indoor and outdoor terminations, conduit, cable raceways, etc., and accessories necessary to complete the installation of equipment in accordance with the Specifications and Drawings, where such installation has not been included in other groups. Utilize AEIC CG5, Underground Extruded Power Cable Pulling Guide to install all cables. See Detailed Specifications Project Drawings, and Cable Schedule.

UNIT K-1 CONDUIT AND BOXES

This construction unit shall consist of the furnishing, installation, and testing of all conduits, conduit fittings, wiring devices, junction boxes, panel-boards, receptacles, and accessories necessary to complete the installation in accordance with these Specifications and Drawings. Included in this unit are the nameplates for identification of devices and equipment in the yard. See Detailed Specifications and Project Drawings.

UNIT K-2 WIRE AND CABLE (Control and Low Voltage)

This construction unit shall consist of the purchasing, installation, and testing of all conductor, conductor connectors, wiring devices, duct, conduit, and accessories necessary to complete the installation in accordance with these Specifications and

Drawings. Splicing of either control or low voltage cable by either its manufacturer or Contractor is not acceptable. Contractor shall remove and replace all spliced wiring with non-spliced, continuous made cable at no additional cost to Owner. Existing Control cables shall be tested, if existing cable do not pass the text, they shall be replaced,

The following 600 Volt conductors shall be replaced:

- Aux. 1 transformer to New 480 V Switchgear
- 480 V Switchgear to New MCC1A
- 480 V Switchgear to New MCC1B
- 480 V Switchgear to New MCC1C
- 480 V Switchgear to New Boiler Feed Pump 1
- 480 V Switchgear to New Boiler Feed Pump 1

See Detailed Specifications and Project Drawings.

UNIT K-3 15 kV POWER CONDUCTORS

This construction unit shall consist of the purchasing, installation, and testing of all 15 kV power conductor (1500 MCM copper conductor, EPR insulation at 133%, and 1/0 copper conductor, EPR insulation at 133%), in accordance with these Specifications and Drawings. Splicing of these conductors by either its manufacturer or Contractor is not acceptable. Contractor shall remove and replace all spliced wiring with non-spliced, continuous made cable at no additional cost to Owner. Utilize AEIC CG5, Underground Extruded Power Cable Pulling Guide to install all cables. Pulling compound shall be compatible with the cable and comply with IEEE Standard 1210, Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable. See Detailed Specifications and Project Drawings.

UNIT K-4 CABLE TRAY

This construction unit shall consist of the purchasing and installation of standard steel ladder cable trays with bottom open ladder type and supports with top open inside the generator building and top covered outside in the substation yard in accordance with these Specifications and Drawings. It is highly recommended the Contractor visit the site of the generating facility substation prior to bidding

GROUP L. **FOUNDATIONS** A construction unit under this group consists of the concrete footings, foundations, pads, and pits as specified. See Detailed Specifications and Project Drawings.

UNIT L-1 CONCRETE FOOTINGS, PIER, SLAB, STEM-WALL, AND FOUNDATIONS

This construction unit shall consist of one (1) cubic yard of reinforced concrete. This rebar reinforced concrete is for all footings, pier, pits, and slab foundations to include the purchasing or furnishing of any, all, and whatever unclassified size, quantity, degree, type, etc., unclassified equipment, materials, qualified labor, etc., are necessary. These foundations shall be installed skillfully, orderly, professionally, and successfully for all the concrete footings, foundations, pads, and pits to include, but not limited to, unclassified

excavation, forming, casing, reinforcing bar, anchor bolt setting whether J-bolt, L-bolt, or deformed bar anchor bolt, backfilling, provide proper fill and compaction, and other unclassified operations. This unique project shall include installation of ground rods with foundations.

This construction unit includes:

- Foundation A
- Foundation B
- Foundation C
- Foundation D
- Foundation G
- Oil Containment Wall
- Drainage slab inside Oil Containment wall
- 4” slab where existing 6” and 4: concrete removed

See Detailed Specifications and Project Drawings.

GROUP M. DEMOLITION, SITE PREPARATION (Grading and Drainage) A construction unit under this group consists of any permitting required by any governing body such as a city, county, state, or federal agency as determined by the substation location; this could include city and county with independent permitting requirements of each or all of these four entities.

UNIT M-1 DEMOLITION, SITE PREPARATION

This construction unit shall consist of the necessary demolition described in the drawings. See Detailed Specifications and Project Drawings.

This unit includes but is not limited to the following:

1. Removal of existing 6” slab

2. Removal of existing 4” slab

3. Contractor to obtain permits and prepare all storm water pollution prevention plans (SWPPP) including methods and forms to report to any appropriate federal, state, county, city, or appropriate entity any event or rain occurrence as required of this location by that agency.

4. It is highly recommended the Contractor visit the site of this new substation prior to bidding.

5. See Detailed Specifications and Project Drawings.

GROUP O. STATION GROUNDING A construction unit under this group consists of the furnishing, installation, and testing of a complete copper ground bus, including grounding rods, with connections to structures, equipment, grates, cable trays and ground wells as specified in sizes shown, except as otherwise provided in other groups. All connections shall be exothermic unless otherwise noted. See Detailed Specifications and Project Drawings.

UNIT O-1 STATION GROUNDING

This construction unit shall consist of the optional procurement and complete installation and testing of all ground bus, connectors, splices, taps, clamps, cable tray, connections to all equipment, hardware, etc. as described herein for structure grounding, equipment grounding, and below grade grounding as shown on the Drawings. Grounding material shall include copper, below ground exothermic welding material, both properly sized and new molds used in the ground grid installation. Above ground connections may be bolted with proper fit required. This project requires discovery, sizing, and tying any existing grid to new grid. See Detailed Specifications and Project Drawings.

UNIT O-2 GROUND WELL

This construction unit shall consist of the complete installation, grid connection, and testing of a ground well as shown on the Drawings and per Drawing ES-50. See Detailed Specifications and Project Drawings

GROUP S. STATION OIL CONTAINMENT A construction unit under this group consists of the furnishing and installation of the complete water/oil separation in the oil containment pit near transformer. See Detailed Specifications and Project Drawings.

UNIT S-1 OIL MINDER PUMP

This construction unit shall consist of the optional procurement and complete installation of an Oil-Minder® Pump model ES-40 by Stancor™ and connections required to complete designed containment vessel and its operational functions. Oil Minder Pump Model ES-40 shall be utilized to the exclusion of all others. See Detailed Specifications and Project Drawings.

GROUP T. 15 KV METALCLAD SWITCHGEAR (OWNER FURNISHED) A construction unit under this group consists of installation one (1) metalclad switchgear as specified. See Detailed Specifications and Project Drawings.

UNIT T-1 15 KV, 1600 A, METALCLAD SWITCHGEAR

This construction unit shall consist of the complete installation and testing of one (1) 15 kV, 1600 A indoor, metalclad switchgear consisting of two (2) 15 kV circuit breakers (one (1) 1600 A and one (1) 600 A) and one (1) 15 kV, 1600 A disconnect switch. Metalclad switchgear is currently in the bid process. When specific details are known, they will be forwarded. After making all connections, a complete final assembled test by an independent third party as determined and designated by Owner or Engineer, requires a complete commissioning test and report. When specific details are known, they will be forwarded to successful bidder. Drawings reflect Engineer's assumption regarding this unit. See Detailed Specifications and Project Drawings.

GROUP U. **480 V SWITCHGEAR AND MOTOR CONTROL CENTER.** A construction unit under this group consists of demolition and installation one (1) 480 V switchgear and motor control center (MCC) as specified. See Detailed Specifications and Project Drawings.

UNIT U-1 480 V SWITCHGEAR (OWNER FURNISHED)

This construction unit shall consist of the complete installation and testing of one (1) 480 V, indoor, 480 switchgear. Also removal of one (1) 480 V, indoor, 480 switchgear. 480 switchgear is currently in the bid process. When specific details are known, they will be forwarded. After making all connections, a complete final assembled test by an independent third party as determined and designated by Owner or Engineer, requires a complete commissioning test and report. When specific details are known, they will be forwarded to successful bidder. Drawings reflect Engineer's assumption regarding this unit. See Detailed Specifications and Project Drawings.

UNIT U-2 MOTOR CONTROL CENTER (OWNER FURNISHED)

This construction unit shall consist of the complete installation and testing of one (1) MCC. Also removal of one two (2) MCCs. MCC is currently in the bid process. When specific details are known, they will be forwarded. After making all connections, a complete final assembled test by an independent third party as determined and designated by Owner or Engineer, requires a complete commissioning test and report. When specific details are known, they will be forwarded to successful bidder. Drawings reflect Engineer's assumption regarding this unit. See Detailed Specifications and Project Drawings.

GROUP V. **PROTECTION WALL.** *A construction unit under this group consists of the installation of a protection wall for the protection of the generating station building and personnel.*

UNIT V-1 PROTECTION WALL

This construction unit shall consist of one (1) cubic yard of reinforced concrete. This rebar reinforced concrete is for all footings, piers, and walls to include the purchasing or furnishing of any, all, and whatever unclassified size, quantity, degree, type, etc., unclassified equipment, materials, qualified labor, etc., are necessary. See Detailed Specifications and Project Drawings.

GROUP W. **TRANSMISSION LINE.** *A construction unit under this group consists of the installation of the transmission line connecting GSU 1 to the transmission grid.* See Detailed Specifications and Project Drawings.

UNIT W-1 SELF SUPPORTING STEEL POLE

This construction unit shall consist of the procurement and complete installation one (1) self-supporting steel pole. See Detailed Specifications and Project Drawings.

UNIT W-2 SELF SUPPORTING STEEL POLE FOUNDATION

This construction unit shall consist of one (1) cubic yard of reinforced concrete. This rebar reinforced concrete is for all caisson to include the purchasing or furnishing of any, all, and whatever unclassified size, quantity, degree, type, etc., unclassified equipment, materials, qualified labor, etc., are necessary. See Detailed Specifications and Project Drawings.

UNIT W-3 WOOD POLE

This construction unit shall consist of the procurement and complete installation one (1) wood pole. See Detailed Specifications and Project Drawings.

UNIT W-4 69 KV, 1200 A GOAB SWITCH

This construction unit shall consist of the procurement and complete installation one (1) 69 kV, 1200 A GOAB one-way, phase over phase switch to be installed on a steel pole. See Detailed Specifications and Project Drawings.

UNIT W-5 69 KV HARDWARE

This construction unit shall consist of the procurement and complete installation of all insulators, bolts, nuts, etc. See Detailed Specifications and Project Drawings.

UNIT W-6 CONDUCTOR AND SHIELD WIRE

This construction unit shall consist of the procurement and complete installation 795 MCM (26/7) ACSR “Drake” conductor and 3/8” EHS shield wire. See Detailed Specifications and Project Drawings.

LIST OF OWNER FURNISHED MATERIALS

(to be included in Unit Prices shown on Bid Sheets)

Item (1)	Supplier	Scheduled Delivery Date	Description of Material	Quantity	Unit Price	Extended Price	Received by Contractor (Date & Initial)
E-1	--	--	69 kV, 600 Amp Circuit Breaker	1	--	--	
H-1	WEG	--	16.8/22.5/30/31.4 MVA 12.5-69 kV Transformer	1	--	--	
T-1	--	--	15 kV Metalclad Switchgear	1	--	--	
U-1	--	--	480 V Switchgear	1	--	--	
					--	--	
U-2	--	--	Motor Control Center	1	--	--	
					--	--	
					--	--	

NOTES:

(1) Item corresponds with item designation in the list of materials in construction drawings. Under Article I, Section 3, the value of these materials will be deducted from payments to the Bidder for completed Construction Assembly Units.

BID PROPOSAL SHEET

BID PROPOSAL SHEET BID SHEET GSU 1 Replacement - Ponca City, Oklahoma							Sheet 1 of 5 Sheets
ASSEMBLY UNIT NO.	NAME AND DESCRIPTION OF ASSEMBLY UNIT	PRICING UNITS	NO. OF UNITS	UNIT PRICES			EXTENDED PRICE LABOR & MATERIAL
				LABOR	MATERIAL	LABOR & MATERIAL	
A-1	69 kV Steel Structures	Lot	1				
A-2	15 kV Steel Structures	Lot	1				
A-3	69 kV Buswork	Lot	1				
A-4	15 kV Buswork	Lot	1				
B-1	69 kV 1200 A 3-Pole Group Operated Air Break Switch	Each	1				
B-2	15 kV, 1200 A 3-Pole Group Operated Air Break Switch	Each	1				
C-1	48 kV MCOV Surge Arrester (Polymer Station Class)	Each	3				
E-1	69 kV, 600 A, Circuit Breaker (Owner Furnished)	Each	1				
H-1	16.8/22.5/30/31.4 MVA 12.5-69 kV Transformer (Owner Furnished)	Each	1				
K-1	Conduit, Boxes	Lot	1				
		Total Extended Labor and Material Prices, This Sheet					
Date	Bidder's Initial	Sub-Total					

BID PROPOSAL SHEET BID SHEET GSU 1 Replacement - Ponca City, Oklahoma							Sheet 2 of 5 Sheets
ASSEMBLY UNIT NO.	NAME AND DESCRIPTION OF ASSEMBLY UNIT	PRICING UNITS	NO. OF UNITS	UNIT PRICES			EXTENDED PRICE LABOR & MATERIAL
				LABOR	MATERIAL	LABOR & MATERIAL	
K-2	Wire, Cable, and Fiber-Optic Cable (Control and Low Voltage)						
	795 MCM ACSR (26/7) Drake	FT	120’				
	1/0 AWG ACSR	FT	50'				
	#6 Copper	FT	690'				
	12/C #10	FT	620'				
	2/C #8	FT	470'				
	4/C #10	FT	840'				
	4/C #8	FT	350'				
	CAT 6	FT	250'				
	3/0 Copper, 600 V Conductor	FT	1325’				
	500 MCM Copper, 600 V Conductor	FT	1750’				
		Total Extended Labor and Material Prices, This Sheet					
		Carried from Previous Sheet					
Date	Bidder's Initial	Sub-Total					

BID PROPOSAL SHEET BID SHEET GSU 1 Replacement - Ponca City, Oklahoma							Sheet 3 of 5 Sheets
ASSEMBLY UNIT NO.	NAME AND DESCRIPTION OF ASSEMBLY UNIT	PRICING UNITS	NO. OF UNITS	UNIT PRICES			EXTENDED PRICE LABOR & MATERIAL
				LABOR	MATERIAL	LABOR & MATERIAL	
K-3	15 kV Power Conductors						
	1500 MCM Copper Conductor, EPR @ 133% 15 kV	FT	1400'				
	1/0 Copper Conductor, EPR @ 133%, 15 kV	FT	450'				
	Indoor Terminations: 1/0 AWG Copper	Each	6				
	Indoor Terminations: 1500 MCM Copper	Each	18				
	Outdoor Terminations: 1500 MCM Copper	Each	6				
K-4	Cable Trays						
	12” wide	FT	400'				
	24” wide	FT	300'				
L-1	Concrete Footings, Piers, Slab, Stem-Wall and Foundations	Cu. Yd.	88.4				
M-1	Demolition, Grading and Site Preparation	Lot	1				
O-1	Station Grounding	Lot	1				
O-2	Ground wells	Each	4				
		Total Extended Labor and Material Prices, This Sheet					
		Carried from Previous Sheet					
Date	Bidder's Initial	Sub-Total					

BID SHEET	GSU 1 Replacement - Ponca City, Oklahoma						Sheet 4 of 5 Sheets
ASSEMBLY UNIT NO.	NAME AND DESCRIPTION OF ASSEMBLY UNIT	PRICING UNITS	NO. OF UNITS	UNIT PRICES			EXTENDED PRICE LABOR & MATERIAL
				LABOR	MATERIAL	LABOR & MATERIAL	
Q-1	Relays, Metering, and Controls	Lot	1				
S-1	Oil Containment	Each	1				
T-1	15 kV Metalclad Switchgear (Owner Furnished)	Lot	1				
U-1	480 V Switchgear (Owner Furnished)	Lot	1				
U-2	Motor Control Center (Owner Furnished)	Lot	1				
V-1	Protection Wall	Cu. Yd.	65.1				
W-1	Self-supporting steel pole	Each	2				
W-2	Self-supporting steel pole foundation	Cu. Yd.	53.8				
		Total Extended Labor and Material Prices, This Sheet					
		Carried from Previous Sheet					
Date	Bidder's Initial	Sub-Total					

BID SHEET	GSU 1 Replacement - Ponca City, Oklahoma						Sheet 5 of 5 Sheets
ASSEMBLY UNIT NO.	NAME AND DESCRIPTION OF ASSEMBLY UNIT	PRICING UNITS	NO. OF UNITS	UNIT PRICES			EXTENDED PRICE LABOR & MATERIAL
				LABOR	MATERIAL	LABOR & MATERIAL	
W-3	Wood pole						
	80', CL 1	Each	3				
	80', Cl H1	Each	1				
W-4	69 KV, 1200 A GOAB Switch, One-way, Phase Over Phase	Each	1				
W-5	69 KV Hardware	Lot	1				
W-6	Conductor and Shield Wire						
	765 MCM (26/7) ACSR “Drake”	FT	2400'				
	3/8” EHS Shield Wire	FT	800'				
	Controls Interface	Lot	1				
	Temporary service to Critical Loads	Lot	1				
		Total Extended Labor and Material Prices, This Sheet					
		Carried from Previous Sheet					
Date	Bidder's Initial	Sub-Total					

CABLE SCHEDULE

Substation: **OMPA GSU1 Replacement**

Circuit Description: **125 V DC Supply**

Date: 08/31/17

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
101	2/C #8	80	DC Panel	EMT/RMC	Transformer	125 V DC Supply
102	2/C #8	60	DC Panel	EMT/RMC/LFNC	69 kV Breaker	125 V DC Supply - Trip #1
103	2/C #8	60	DC Panel	EMT/RMC/LFNC	69 kV Breaker	125 V DC Supply - Trip #2
104	2/C #8	60	DC Panel	EMT/RMC	69 kV Breaker	125 V DC Supply - Aux Pwr
105	2/C #8	50	DC Panel	PVC	15 kV Switchgear	125 V DC Supply - Bkr #1
106	2/C #8	60	DC Panel	PVC	15 kV Switchgear	125 V DC Supply - Bkr #2
107	2/C #8	80	DC Panel	PVC	Relay Cabinet	125 V DC Supply

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

Substation: **OMPA GSU1 Replacement**

Circuit Description: **120/240V AC Supply**

Date: 08/31/17

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
201	(3) #6	220	AC Panel	EMT/RMC	Transformer	240 V AC Supply -
202	4/C #8	60	AC Panel	RMC	69 kV Breaker	240 V AC Supply -
203	4/C #8	70	AC Panel	RMC/LFNC	Oil Containment	240 V AC Supply -
204	4/C #8	100	AC Panel	PVC	15 kV Switchgear	240 V AC Supply -
205	4/C #8	100	AC Panel	PVC	Relay Cabinet	240 V AC Supply -

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

Substation: **OMPA GSU1 Replacement**

Circuit Description: **Currents**

Date: 08/31/17

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
301	4/C #10	140	Relay Cabinet	CT/PVC	Transformer	CTs
302	4/C #10	140	Relay Cabinet	CT/PVC	Transformer	CTs
303	4/C #10	140	Relay Cabinet	CT/PVC	Transformer	Spare
304	4/C #10	160	Relay Cabinet	CT/PVC	69 kV Breaker	CTs
305	4/C #10	160	Relay Cabinet	CT/PVC	69 kV Breaker	Spare

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

Substation: **OMPA GSU1 Replacement**

Circuit Description: **Potentials**

Date: 08/31/17

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
401	4/C #10	30	Relay Cabinet	PVC	Switchgear	PTs
402	4/C #10	30	Relay Cabinet	PVC	Switchgear	PTs

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

Substation: **OMPA GSU1 Replacement**

Circuit Description: **Controls**

Date: 08/31/17

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
501	12/C #10	180	Relay Cabinet	EMT/RMC/LFNC	69 kV Breaker	Controls
502	12/C #10	180	Relay Cabinet	EMT/RMC/LFNC	69 kV Breaker	Controls
503	12/C #10	30	Relay Cabinet	PVC	Switchgear	Controls
504	12/C #10	100	Relay Cabinet	PVC	Control Room	Controls
505	12/C #10	100	Relay Cabinet	PVC	Control Room	Controls

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

Substation: **OMPA GSU1 Replacement**

Circuit Description: **Communications**

Date: 07/01/13

CABLE SCHEDULE

Circuit Number	Number and Type Conductor	Circuit Feet	From	Via	To	Service
601	CAT 6	140	Relay Cabinet	PVC	Transformer	Communications
602	Serial	30	Relay Cabinet	PVC	15 kV Switchgear	Communications
603	Serial	30	Relay Cabinet	PVC	15 kV Switchgear	Communications
604	CAT 6	100	Relay Cabinet	PVC	Control Room	Communications

LEGEND:

CT - Cable Tray
RMC - Ridged Metal Conduit
PVC - PVC Conduit
EMT - Electrical Metal Conduit
LFNC - Liquidtight Flexible Non-Metallic Conduit

GSU1 REPLACEMENT PROJECT

EQUIPMENT DATA

(To Be Filled In By Bidder)

NOTE:

1. Mandatory delivery dates and the respective material supplier for each of the following listed construction units are to be filled in by the Bidder. Incomplete data will be sufficient cause to reject the Bidder's Proposal.

2. The Contractor shall furnish equipment as noted below at time of bid unless specifically otherwise approved by the Engineer.

3. Equipment must be on REA Bulletin 43-5 Acceptable List of Materials where applicable or otherwise approved by the Engineer.

UNITS

A-1	69 kV Steel Structures	Manufacturer _____
		Type _____
		Delivery Date _____
A-2	15 kV Steel Structures	Manufacturer _____
		Type _____
		Delivery Date _____
A-3	69 kV Buswork	Manufacturer _____
		Type _____
		Delivery Date _____
	69 kV Bus Connection and Fittings	Manufacturer _____
		Type _____
		Delivery Date _____

UNITS

A-4	15 kV Buswork	Manufacturer _____ Type _____ Delivery Date _____
	15 kV Bus Connection and Fittings	Manufacturer _____ Type _____ Delivery Date _____
B-1	69 kV, 1200 A Group Operated Disconnect Switch	Manufacturer _____ Type _____ Delivery Date _____
B-2	15 kV, 1600 A Group Operated Disconnect Switch	Manufacturer _____ Type _____ Delivery Date _____
C-1	48 kV MCOV Surge Arrester	Manufacturer _____ Type _____ Delivery Date _____
K-1	Conduit, Boxes, and Fittings	Manufacturer _____ Type _____ Delivery Date_____
K-2	Wire and Cable (Low Voltage and Control)	Manufacturer _____ Type _____ Delivery Date_____

UNITS

K-3	15 kV Power Conductor	Manufacturer _____ Type _____ Delivery Date_____
	15 kV Terminations	Manufacturer _____ Type _____ Delivery Date_____
K-4	Cable Tray	Manufacturer _____ Type _____ Delivery Date_____
L-1	Concrete (Foundations, Footing, Pits)	Name and Address of Concrete Sub-Contractor (if applicable)_____ _____ _____
O-1	Station Grounding	Manufacturer _____ Type _____ Delivery Date_____
Q-1	Relays, Metering and Controls	Manufacturer _____ Type _____ Delivery Date_____

UNITS

S-1	Oil Containment Pump	Manufacturer _____ Type Oil-Minder SE-40 _____ Delivery Date_____
V-1	Protection wall Concrete (Foundations, Wall)	Name and Address of Concrete Sub-Contractor (if applicable)_____ _____ _____
W-1	Self Supporting Steel Poles	Manufacturer _____ Type _____ Delivery Date_____
W-2	Self Supporting Steel Pole Foundation	Name and Address of Concrete Sub-Contractor _____ _____ _____
W-3	Wood Poles	Manufacturer _____ Type _____ Delivery Date_____
W-4	69 kV, 1200 A GOAB Switch	Manufacturer _____ Type _____ Delivery Date_____

UNITS

W-5	69 kV Hardware	Manufacturer _____ Type _____ Delivery Date_____
W-6	Conductor and Shield Wire	Manufacturer _____ Type _____ Delivery Date_____
------	Name of Testing Company	Name(s) and Address(s) of Testing Sub-Contractor(s) (if applicable) _____ _____ _____

EXCEPTION NOTE:

Details of any exceptions taken to any part of these specifications shall be documented on a separate sheet attached to this Proposal. If no exceptions taken, so state.

Yes _____ No _____

_____
Contractor/Manufacturer
Represented by the Bidder

_____
Area Code Telephone Number of Manufacturer

_____
Bidder Proposal Number

_____
Name of Bidder

_____

DETAILED SPECIFICATIONS

GENERAL

1. These Detailed Specifications supplement the description of construction units and are included as a part of the contract.
2. All materials and equipment shall be of the type and manufacture as shown in the latest issue list and supplement of "List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers" or shall be pre-approved by the Engineer.
3. These specifications are considered correct; however, the successful bidder will be required to provide a complete and workable scheme regardless of any omissions or discrepancies in these specifications at no additional cost to the Owner.
4. The Contractor shall correct promptly all errors in equipment discovered in the field at no cost to the Owner.

STANDARDS

1. All equipment manufactured, furnished, and tested, unless otherwise specified herein, shall be in accordance with the best modern practice and shall conform to the latest applicable standards of:
   - a) NEMA/National Electrical Manufacturer's Association.
   - b) ANSI/American National Standards Institute.
   - c) IEEE/Institute of Electrical and Electronic Engineers.
   - d) EIA/Electronic Industries Association.
   - e) ASTM/American Society for Testing and Materials.
   - f) ICEA/Insulated Cable Engineers Association.
   - g) ASQC/American Standards Qualifications Committee.
   - h) NESC/National Electrical Safety Code C2-2012
   - i) NEC/National Electric Code NFPA 70-2011
2. Any details not specifically covered shall be subject to the judgment of the Engineer. In the event of conflicting requirements between the above standards and these Specifications, the terms of these Specifications shall apply.

MANUFACTURER'S FIELD SUPERVISION

1. The services of a qualified manufacturer's Service Engineer or representative shall be provided, as required and specified for the equipment. The duties shall include the following:

    a. Instruct the personnel installing equipment in proper assembly and installation, when and if requested by the Owner and Engineer.

    b. Inspect, adjust, and test equipment after installation for proper electrical and mechanical operation.

    c. Instruct the Owner's personnel in the proper operation and maintenance of equipment furnished.

2. Personnel shall be provided who are qualified in servicing and placing in operation the specific manufacturer's type and class of equipment furnished. Personnel furnished shall be satisfactory to the Owner, and Engineer, or the personnel shall be replaced with persons who are satisfactory, without additional charge to the Owner.

DRAWINGS AND INSTALLATION DATA

1. This section covers the submission of shop drawings and other data for all sections of the technical specifications necessary for the proper development, coordination, installation of equipment, and materials under this contract.

2. The successful Bidder will be issued one (1) set of hardcopy prints or one (1) electronic copy of all Owner-Furnished Material.

3. Submittal requirements:

    a. When the Contractor makes his submittal to the Engineer for review and comments, it shall include the following:

        (1) Title page with job name, job location, Owner’s name, Engineer's name, general contractor's name, and any associated subcontractor's name.

        (2) Four (4) hardcopy copies of review prints. One (1) print will be returned marked "No Exception Taken," "Furnish as Corrected," "Revise and Resubmit," or "Rejected." Electronic drawings in AutoCAD 2010 to 2013 and PDF formats are acceptable to e-mail to Engineer. However, AutoCAD is preferred.

        (3) <u>Catalog sheets and data sheets are not acceptable.</u>

4. The drawings to be furnished shall include, but not be limited to, the following:

    a. For all groups:

        (1) Outline drawings showing location of connections and all clearances required for erection and operation.

        (2) Outline drawings of bus supports, connectors, bushings, etc.

        (3) Renewal parts data to include catalog numbers, part numbers, and manufacturer contact information.

(4) Complete bill of materials.

(5) Instruction books for installation, maintenance, and operation.

(6) Drawings showing bills of material and location of all material to be installed to include mounting dimensions for all equipment and accessories.

(7) Catalog Sheets or Data Sheets are not acceptable.

b. For Group K materials:

(1) Outline drawings of all equipment indicating mounting dimensions.

(2) Schematic and connection diagrams indicating all primary and secondary equipment, terminal numbers, device descriptions, etc.

(3) Instruction books for installation, maintenance, parts replacement, and operation.

(4) Material and Nameplate Lists.

(5) The above applies to all AC and DC panelboards, safety switches, transfer switches, lighting, photocells, etc. Manufacturer's data regarding special handling, dimensions, recommendations for installation, insulation composition, limitation of performance, etc. for low voltage control and power cable.

(6) Manufacturer specification sheets for all cable. Catalog Sheets or Data Sheets are not acceptable.

(7) Cable splices for control, low, and power voltage cables are not permitted by either cable manufacturer or by Contractor.

c. For Group L materials:

(1) Shop drawings and setting diagrams for reinforcing steel, with list of bars and bending diagrams.

(2) Reinforcing steel will not be approved by the Engineer until anchor bolts have been approved.

d. For Group O materials:

(1) Manufacturer's data on all materials.

5. Each submittal will be reviewed and copies returned with notations regarding the information and data submitted.

6. The equipment being supplied should be clearly indicated on a general submittal.

7. Changes indicated on the shop drawings shall be incorporated in the finished product. It shall be the responsibility of the Contractor to provide for coordination between the different disciplines, crafts, subcontractors, vendors, etc. that may be involved in relation to each submittal.

8. Regardless of corrections made or approval given by the Engineer, the Contractor shall be responsible for the accuracy of shop drawings and for their conformity to project plans and specifications.

9. Any submittals not in accordance with these instructions shall be returned to the Contractor for completion.

NAMEPLATES

1. Nameplates shall be placed throughout the station for identification of phases, buses, switches and other major electrical equipment. These nameplates shall be in accordance with the following:

   a. Be made of phenolic plastic non-asbestos material, laminated black and white with a dull black satin finish and beveled edges to show white lamination.

   b. Nameplates shall be mounted by bolting to trusses, columns, and equipment with metal screws or with machine bolts tapped into the structure. The location and mounting of nameplates is to be as directed by the Engineer or the Owner's designee.

2. The standard nameplate drawing included in the back of these specifications gives details of the nameplates to be furnished. The nameplates to be provided, not including switchboard nameplates, are:

Nameplate Type or Size No.	No. of Lines	Quantity as Req. By Engineer
2	1	"
3	1	"
4	2	"
5	1	"
5	2	"
Equipment Identification -		"
Phase Identification -		"
Breaker Identification -		"

SHIPMENT

1. Equipment shall be packaged and shipped as follows:

   a. With instruction book, packing list, and special storage instructions in both a weather protected envelop and enclosure.

   b. Adequately protected to prevent damage by high humidity, water, ice, snow, dust, etc.

2. Notice of Shipment and/or Bill of Lading covering all items shipped shall be addressed to the Owner, but distributed as follows:

Owner	1
Engineer-Home Office	1
Resident Engineer or Inspector at Project Site	1

3. When shipping clearances and handling facilities permit, equipment shall be shipped completely assembled.

4. All scheduling of oil shipments shall be coordinated with and approved by the Owner and Resident Engineer or Inspector.

5. It is the responsibility of the Vendor to deliver the complete material described in this contract on or before the date noted in this contract. Any costs incurred for any unforeseen special type of shipment (for example, shipping short, shipping express, single ship of this contract equipment only, etc.) shall be paid by the Contractor.

6. The Engineer will be notified at least five (5) days prior to the actual shipping date of the equipment. The equipment will be inspected for damage before it is offloaded at the site and any damage no matter the degree or severity shall be noted and reported to the Engineer or Inspector. Should internal damage(s) be discovered later, the Contractor is still responsible for remedial action as approved by the Engineer and Contractor shall promptly report any damage.

INSPECTION

1. The Engineer, on behalf of the Owner, or the Owner, may appoint Inspectors whose duty it shall be to oversee the work, including tests of equipment, is done properly and in accordance with these specifications. Inspectors shall have full access to the work and shall have authority, subject to final decision of Engineer, to condemn and reject any defective work or material at no additional cost to the Owner.

FIELD TESTING

2. **General Requirements**

   a. Any exceptions taken to testing requirements and test equipment shall be noted by the Contractor on the Equipment Data sheets.

   b. The Contractor's substation electrician shall assist the Engineer or Inspector with all energization test and checks required.

   c. Testing of the equipment shall be provided as indicated in this section, under the description of the various construction units and as described in equipment manufacturer's instructions.

   d. Schedules for equipment tests shall be submitted to the Engineer for approval. All tests will be witnessed by the Engineer, Inspector, or Owner's designee. All testing requires five days prior notice to Engineer.

   e. Supply all necessary testing power, test equipment, gas and oil handling equipment required to meet the testing requirements. Portable generator use, when necessary, shall not be smaller than 15 kW.

   f. The coordination of all testing with regard to timely use of test equipment or gas and oil handling equipment is the responsibility of the Contractor.

   g. If equipment is damaged, either in shipment or during installation and/or testing, additional tests shall be made as recommended by the manufacturer and as specified prior to equipment accepted for service or substation commissioning.

   h. Any equipment installed by the Contractor found to be defective during installation; testing; or energization shall be corrected by the Contractor at no additional cost to the Owner.

i. Test Reports shall be furnished in both typed electronic format, such as Adobe Acrobat i.e., PDF and in hardcopy in quantities indicated for each.

3. General Description

a. These specifications require field testing in addition to manufacturer's recommended test and checks and any procedures given within the construction units.

b. It is the intent of this specification that field testing by this contract be both extensive and complete, to provide positive assurance of totally correct installation and operation of all equipment erected, installed, and/or provided under this contract.

c. Testing includes, but is not limited to, the following:

(1) Test all wire, cable, electrical equipment and systems installed, modified or connected by this contract to assure proper installation, adjustment, setting, connection, and functioning in accordance with the drawings, these specifications, settings to be supplied by the Engineer, the manufacturer's instructions and recommendations.

(2) Furnish all qualified personnel and labor required for and incidental to check out and testing prior to commissioning substation.

(3) Furnish test equipment necessary and required, including, but not limited to, special equipment for complete testing of the substation equipment such as power transformers, SF6 gas breakers, CCVT's, PT's, and CT's, etc.

(4) Includes field testing to be done during initial energization of substation equipment and electrical systems installed, modified or constructed by this contract.

d. Include all tests recommended by the equipment manufacturer and as specified unless specifically waived by the Engineer.

e. The Engineer, along with the Owner, or each ones designee will witness a final operational test of each individual system installed by this Contractor on this project.

f. It is anticipated there will be frequent occasions when testing will have to be performed outside regular working hours. This testing would primarily be related to work during initial energization testing and load testing of equipment and systems. Other possible work of this nature would be under critical situations where the safety of men or equipment and progress of the overall project work is concerned.

g. Connections shall NOT be made or testing done on existing equipment, facilities, circuits, or systems without receiving proper authorization from the Owner. The Owner reserves the right to have personnel present when connections are made or tested by this contract. Scheduling for such work shall be through the Engineer, and is subject to the Owner's approval. Work may be rescheduled at the Owner's discretion at no additional cost to the Owner.

4. Quality Assurance

a. Applicable Standards:

(1) American National Standards Institute (ANSI).

(2) American Society for Testing and Materials (ASTM).

(3) Insulated Cable Engineers Association (ICEA).

(a) ICEA S-97-682-2013 Standard For Utility Shielded Power Cables Rated 5 Through 46 kV

(4) National Electrical Code (NEC, NFPA 70-2011).

(5) National Electrical Manufacturers Association (NEMA).

(6) The Institute of Electrical and Electronics Engineers, Inc., (IEEE).

(7) National Electric Safety Code (NESC C2-2012)

(8) InterNational Electrical Testing Association (NETA)

5. Test Equipment

a. The Contractor shall provide all equipment necessary to perform all test and checks as specified and determined necessary by the Engineer.

b. Portable generator for testing power shall not be smaller than 15 kW.

6. Reports

a. Test Reports:

(1) Submit three (3) final typed and bound (alternatively a PDF single (1) copy) test reports with indices, section dividers and tabs to the Engineer for approval. After final approval, submit six (6) copies to the Engineer and one Adobe Acrobat PDF file (via e-mail) such that each shall be distributed by the Engineer.

(2) Test report shall include in the first section a summary of equipment tests that were out of tolerance or defective. This summary should also include a description of corrective action taken to bring within tolerance or correction of defect and final test result that is within tolerance.

(3) Maintain a legible written or typed record of all tests showing date, personnel making test, equipment tested, material tested, tests performed, and results of each test. Record last calibration date of all testing equipment used to perform any of these test within the report; note calibration date required within past twelve months of test date. A copy of these reports shall be submitted to the Resident Engineer on a weekly basis or e-mailed in PDF the day after the test to the Engineer.

(4) Notify Engineer two (2) weeks prior to commencement of all testing.

7. Types of Tests

a. Power Factor (10 kV Doble Test Set with Doble Support)

b. Megger

c. Earth resistance

d. Hi-Pot

e. Oil Dielectric

f. Gases in Oil

g. TTR; Transformer Turns Ratio

8. Types of Equipment

a. Types of equipment required to be tested by these specifications or the Engineer includes but is not limited to the following:

(1) Surge Arresters

(2) Potential Transformers

(3) Metering

(4) Current Transformers

(5) Power Transformer (After manufacturer's Field Assembly and Field Test)

(6) 69 kV Switch Sequence Closing/Opening Operability/Timing

(7) 69 kV Power Circuit Breakers Sequence Closing/Opening Operability and Approved Timing Test-set

(8) Grounding

(9) 15 kV Power Circuit Breakers Sequence Closing/Opening Operability and Approved Timing Test-set

(10) 15 kV Switch Sequence Closing/Opening Operability/Timing

(11) 480 V Breakers

(12) 480 V Motor Control Centers

NOTE: Those switches that require piercings shall <u>not</u> be "final" pierced until Owner is satisfied with operability after time sequencing test of each.

9. Test Descriptions

The Contractor shall perform the following tests on all mechanical and electrical equipment.

These test descriptions are given as a general guide for performance of specified test. These descriptions do not preclude or should not be done in lieu of the latest industry practice and safety precautions or manufacturer's precaution or requirements.

These descriptions do not cover all areas of testing and are provided as a guide only. The Contractor shall review with the Engineer, the preferred method of testing when not provided by the manufacturer, or the Contractor feels that the following methods are not in accordance with a safe, effective, and best practices.

a. Doble Testing:

(1) All power circuit breakers/circuit switchers.

(2) All high and low voltage power transformers.

(3) All arresters.

(4) All PT's.

(5) All external current transformers.

b. Ground Testing:

(1) All tests to be done in the presence of the Engineer or his designee.

(2) Measure grounding riser resistance to the ground grid for all risers used to ground primary connected equipment such as; Transformers, Reclosers, Breakers, OCBs, OCR's, PT's, Arresters, etc.

(a) Disconnect riser from equipment.

(b) Connect high current set to riser under test and to the ground grid a minimum of at least 30' from riser under test.

(c) Apply 100 Amp DC to riser and measure resistance. (Limit is three-milliohm or less (≤3 mΩ))

(d) Record **AMPS APPLIED AND MEASURED RESISTANCE** for each location tested and notify the Engineer of the results in a written report per Item E (via e-mail within Adobe Acrobat PDF format file is acceptable).

(3) Test the substation grid resistance to "remote" earth using a three-point (3-pt) method from each of the four (4) substation fence corners and at least two (2) opposite sides in the following manner:

(a) Extend an insulated conductor to a current electrode, 1,000 feet diagonally away from one corner of the substation grid.

(b) Extend potential electrode to 800 feet from the corner of the substation fence and record resistance.

(c) Relocate potential electrode fifty feet (50') closer to the substation corner and repeat test, continue in a like manner for ground tests until a distance of two-hundred feet (200’) away from the substation grid is reached for the potential electrode.

(d) Record results and notify the Engineer of the results in a written report (per Item E above - via e-mail within Adobe Acrobat PDF format file is acceptable).

(4) Perform a ground rise potential test in accordance with the requirements of the local telephone company.

c. High Potential Testing:

(1) Observe all precautions to insure the safety of all personnel associated with and near the area of the test.

(2) Prior to the commencement of the test perform a visual inspection of equipment to be tested for dirt and moisture accumulation and to assure work is complete.

(3) Record air conditions prior to the test:

(a) Temperature.

(b) Barometric pressure.

(c) Humidity.

(4) Perform megger test prior to high potential test.

d. Insulating oil tests:

(1) Visual inspection for dirt, dust, and other foreign contaminants.

(2) Perform dielectric tests in accordance with American National Standard (ASTM):

(a) Dielectric Test 0877

(b) Interfacial Tensions 0971

(c) Visual Color 01524

(d) Neutral Number 0974

(e) Specific Gravity 01298

(f) Power Factor @ 25° C. 0924

(g) Karl Fisher Water Content 01533

(h) Dissolved Gas Analysis 03612

(i) All the above tests, (1) through (8), should be performed on the transformer's main tank. All tests should be evaluated by the laboratory performing the oil tests.

10. Equipment Test

The following is a listing of the major equipment test to be performed under this contract. Any equipment not listed shall be tested in accordance with the guidelines in the previous paragraphs of Field Testing section in these specifications.

a. Oil-Filled Transformer:

1) Doble Test:

(a) Transformer winding

(b) The transformer's bushing to include testing for C1, PF1, C2, and PF2. On all bushings that have a capacitance tap test points. Compare value of C1, PF1, C2, and PF2 to nameplate data.

(c) Excitation test shall be performed.

(d) Test shall be performed using a 10 KV Doble Test Set, i.e., M4000.

(e) Test results shall be corrected for temperature.

(f) All the above tests shall be evaluated. Questionable test results will be evaluated by Doble Engineering in writing with copy of Doble report sent to the Engineer.

2) TTR turns ratio test.

(a) A TTR test is to be performed on all on-load tap changer (LTC) taps with the no load tap changer set in the middle position and compared to the calculated value from the transformer nameplate.

(b) A TTR test is to be performed on all no load tap changer positions with the LTC in the neutral position.

(c) The LTC shall be returned to the neutral position and the no load tap changer shall be returned to the position designated by the Engineer.

3) Coordinate and perform instrument transformer tests on CT's within transformer assembly.

4) Verify the sudden pressure relay operates the lockout relay.

5) Insulating oil tests

6) Alarm sensors tests (top oil temperature, winding temperature, low oil, etc.)

7) Cooling equipment

(a) Motor rotation

(b) Motor starting current

(c) Motor controls and operation functionality

(d) Equipment control

8) Annunciator and alarm checkout

9) Grounding tests

10) Check all bolted connections and contacts for tightness, including bushing current transformer connections.

11) Check device to see if it is level on its foundation, applying shims as required of Construction Contractor.

12) Check and measure grounding connection; notify the Engineer if more than one-half ohm (0.5 Ω) and in any case include value in written report to Engineer per Item E.

13) Check device for oil or air leaks, loose hardware, broken or chipped porcelain, missing cotter pins, loose gasket covers, operation of cabinet heaters, operation of pumps, air, oil, or hydraulic gauges, safety valves, and accessories. Check pressure switches.

(a) Electronic photographs of any broken or chipped porcelain, missing cotter pins, damaged gauges, and other physical discrepancies are acceptable for written report to Engineer per Item E.

14) Check to determine if fans and/or oil pumps run excessively.

15) Check calibration of all voltage regulator controls manual, remote – local, auto, and back up equipment.

16) Other tests as may be required or recommended by the manufacturer.

b. High-Voltage Air Break Switches:

1) Adjust, lubricate, and check all switch operating mechanisms for proper correct operation after all external buses have been connected.

2) Check that switch operator handles are grounded directly to the respective switch operator ground plate and structure.

3) Test timing of each to assure proper switchblades closing / opening sequence is within five milliseconds and provide oscillography printout.

4) Completely adjust switches to the operational satisfaction of the Owner. Owner's personnel shall operate each switch and immediately following acceptance, the Contractor will set all piercing screws after Owner's personnel accept switch.

5) Adjust load break devices and/or motor operator according to manufacturer's instructions.

c. Lighting and Heater Tests:

1) Test all systems for proper operation and correct phasing prior to final acceptance.

2) Test emergency lighting conditions prior to final acceptance.

3) Adjust at night to provide best light distribution of the substation area and equipment.

d. Surge Arresters:

1) Doble test.

e. PT's and CT's

1) Doble test.

2) Ratio test.

11. Control Cables:

a. Contractor shall test all new and existing control cables. Existing control cables include control cables to and from 480 Volt switchgear and MCCs.

(1) Existing control cables which do not pass test shall be replaced

(2) Notify Engineer prior to replacing.

b. NETA MTS 7.3.2 should be followed for all control cable and low voltage cable testing.

c. Determine that all terminations are properly lugged, crimped, and screwed down on terminal blocks

d. Verify cable numbers and terminal block termination points are properly indicated

e. Determine if control cable is spliced either by factory or by contractor as neither is acceptable practice and must be replaced prior to placing in-service.

12. Miscellaneous Equipment Tests:

a. Test all miscellaneous equipment furnished as recommended by equipment manufacturer and as described previously under Field Testing section.

13. High Current Tests:

a. Simulate actual load current operation of the substation electrical systems.

b. Pass large, controlled, AC currents (100 to 400 amperes, or more) through various sections of bus and/or equipment as necessary to check all CT circuits

associated with protective relays, meters, and instrument current circuits. Check for proper current ratio and phase angle at each instrument.

14. Potential Circuit Tests:

a. Pull fuses from PT junction box and apply 3-phase voltage of proper phase-to-phase and phase-to-ground voltages to the load side of the fuse blocks.

b. With a voltmeter and phase angle meter, check for proper voltages and angles at all relays, instruments, switches, etc., that should be connected in the circuit.

c. Measure the burden of each potential circuit.

d. Repeat for each PT junction box.

15. Relays:

a. Verify Nameplate for proper voltage rating.

b. Check for physical damage.

c. Review the instruction book to verify that all the jumpers, dip switches and adjustments are correct for the application to which the relay is to be applied.

d. Test and set all relays to values provided by the Engineer.

(1) All overcurrent protective devices will be tested on three points of the multiples of pick up versus time curve.

(2) All differential relays will have a minimum of 4 tests at relay setting.

(a) Unrestrain tripping/instantaneous unit (87U)

(b) Minimum pickup (87R)

(c) Percent Slope (%) Test or through current restraint test

(d) Harmonic restraint test

(e) Test (e) to be performed on 3 phase differential relay only, i.e. SEL-387 relays. Test (e) applies to new installation of differential relays only.

e. Simulate maximum transformer MVA; testing differential relay at relay settings. Test (d) is to be performed with 6 independent current sources. While performing test (d) interrogate the relay's differential characteristic and record.

f. The function of all input and output (I/O) units is to be verified on all protective relays.

g. Timing test shall be completed with an approved electronic test set.

16. 15 kV Switchgear

a. Manufacture/Seller to provide site acceptance procedure (SAT). The SAT shall include:

(1) A comprehensive checklist to be used by the Owner during the SAT.

(2) Manufacturer/Seller shall perform a complete functional test to demonstrate the installed switchgear meets all the Owner’s requirements.

(3) Upon successful completion of the SAT and SAT punchlist items to Owner’s satisfaction, the switchgear shall be considered ready for plant operations.

(4) Manufacturer/Seller shall correct any punch list items from the SAT within 30 days after SAT completion. Manufacturer/Seller shall notify Owner in writing when all SAT punchlist items have been completed.

b. Contractor to test per specifications above:

(1) Breakers

(2) Switch

(3) PTs

c. Contractor to verify mechanical and electrical operation of interlocks

17. 480 Volt Switchgear

a. Field Quality Control

(1) Tests and Inspections:

(a) Comply with provisions of NFPA 70B, "Testing and Test Methods" Chapter and of NETA ATS.

(b) After installing switchgear and after electrical circuitry has been energized, test for compliance with requirements.

(c) Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.

(d) Visual and Mechanical Inspection:

i Verify that fuse and circuit-breaker sizes and types correspond to Drawings.

ii Verify that current and voltage transformer ratios correspond to Drawings.

iii Inspect bolted electrical connections for high resistance using one of the following two methods:

(i) Use a low-resistance ohmmeter to compare bolted-connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

(ii) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

iv Confirm correct operation and sequencing of electrical and mechanical interlock systems.

(i) Attempt closure on locked-open devices. Attempt to open locked-closed devices.

(ii) Make key exchange with devices operated in off-normal positions.

v Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

vi Inspect insulators for evidence of physical damage or contaminated surfaces.

vii Verify correct barrier and shutter installation and operation.

viii Exercise active components.

ix Inspect mechanical indicating devices for correct operation.

x Verify that filters are in place and that vents are clear.

xi Perform visual and mechanical inspection of instrument transformers according to "Instrument Transformer Field Tests" Paragraph.

xii Inspect control power transformers.

(i) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

(ii) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.

(iii) Verify correct functioning of drawout disconnecting and grounding contacts and interlocks.

(e) Electrical Tests:

i Perform dc voltage insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground, for one minute. If the bus temperature is other than plus or minus 20 deg C, adjust the resulting resistance as provided in NETA ATS, Table 100.11.

(i) Insulation-resistance values of bus insulation shall be according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Investigate and correct values of insulation resistance less than manufacturer's written instructions or NETA ATS, Table 100.1.

(ii) Do not proceed to the dielectric withstand voltage tests until insulation-resistance levels are raised above minimum values.

ii Perform a dielectric withstand voltage test on each bus section, phase-to-ground with phases not under test grounded, according to manufacturer's published data. If

manufacturer has no recommendation for this test, it shall be conducted according to NETA ATS, Table 100.2. Apply the test voltage for one minute.

(i) If no evidence of distress or insulation failure is observed by the end of the total time of voltage application during the dielectric withstand test, the test specimen is considered to have passed the test.

iii Perform insulation-resistance tests on control wiring for ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid-state components or control devices that cannot tolerate the applied voltage, follow the manufacturer's written instruction.

(i) Minimum insulation-resistance values of control wiring shall not be less than 2 megohms.

iv Control Power Transformers:

(i) Perform insulation-resistance tests. Perform measurements from winding-to-winding and each winding-to-ground. Insulation-resistance values of winding insulation shall be according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Investigate and correct values of insulation resistance less than manufacturer's written instructions or NETA ATS, Table 100.1.

(ii) Perform secondary wiring integrity test. Disconnect transformer at secondary terminals and connect secondary wiring to a rated secondary voltage source. Verify correct potential at all devices.

(iii) Verify correct secondary voltage by energizing the primary winding with system voltage. Measure secondary voltage with the secondary wiring disconnected.

(iv) Verify correct function of control transfer relays located in the switchgear with multiple control power sources.

v Voltage Transformers:

(i) Perform secondary wiring integrity test. Verify correct potential at all devices.

(ii) Verify secondary voltages by energizing the primary winding with system voltage.

vi Perform current-injection tests on the entire current circuit in each section of switchgear.

(i) Perform current tests by secondary injection with magnitudes such that a minimum 1.0-A current flows in the secondary circuit. Verify correct magnitude of current at each device in the circuit.

vii Perform system function tests according to "System Function Tests" Article.

viii Verify operation of space heaters.

ix Perform phasing checks on double-ended or dual-source switchgear to ensure correct bus phasing from each source.

(2) Circuit-Breaker Field Tests:

(a) Visual and Mechanical Inspection:

i Inspect physical and mechanical condition.

ii Inspect anchorage, alignment, and grounding.

iii Verify that all maintenance devices are available for servicing and operating the breaker.

iv Verify the unit is clean.

v Verify that the arc chutes are intact.

vi Inspect moving and stationary contacts for condition and alignment.

vii Verify that primary and secondary contact wipe and other dimensions vital to satisfactory operation of the breaker are correct.

viii Perform mechanical operator and contact alignment tests on both the breaker and its operating mechanism according to manufacturer's published data.

ix Verify cell fit and element alignment.

x Verify racking mechanism operation.

xi Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

xii Perform adjustments for final protective-device settings according to coordination study provided by Owner.

xiii Record as-found and as-left operation counter readings.

(b) Electrical Tests:

i Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to ground with switch closed, and across each open pole. Apply voltage according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.1. Insulation-resistance values shall be according to manufacturer's published data. In the

absence of manufacturer's published data, comply with NETA ATS, Table 100.1. Values of insulation resistance less than Table 100.1 or manufacturer's written instructions shall be investigated.

ii Measure contact resistance across each power contact of the circuit breaker. Microhm or dc millivolt drop values shall not exceed the high levels of the normal range as indicated in manufacturer's published data. In the absence of manufacturer's published data, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

iii Determine long-time pickup and delay by primary current injection. Long-time pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors. If manufacturer's curves are unavailable, trip times shall not exceed the value shown in NETA ATS, Table 100.7.

iv Determine short-time pickup and delay by primary current injection. Short-time pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current tolerance band.

v Determine ground-fault pickup and delay by primary current injection. Ground-fault pickup values shall be as specified, and the trip characteristic shall not exceed manufacturer's published time-current tolerance band.

vi Determine instantaneous pickup value by primary current injection. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.8.

vii Test functions of the trip unit by means of secondary injection. Pickup values and trip characteristic shall be as specified and within manufacturer's published tolerances.

viii Perform minimum pickup voltage tests on shunt trip and close coils according to manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall comply with manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.20.

ix Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

x Verify correct operation of any auxiliary features, such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free operation, antipump

function, and trip-unit battery condition. Reset trip logs and indicators. Auxiliary features shall operate according to manufacturer's published data.

xi Verify operation of charging mechanism. Charging mechanism shall operate according to manufacturer's published data.

(3) Ground-Resistance Test:

(a) Visual and Mechanical Inspection:

i Verify that ground system complies with the Contract Documents and with NFPA 70, Article 250, "Grounding and Bonding."

ii Inspect physical and mechanical condition. Grounding system electrical and mechanical connections shall be free of corrosion.

iii Inspect bolted electrical connections for high resistance using one of the following two methods:

(i) Use a low-resistance ohmmeter to compare bolted-connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

(ii) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

iv Inspect anchorage.

(b) Electrical Tests:

i Perform fall-of-potential or alternative test according to IEEE 81 on the main grounding electrode or system. Resistance between the main grounding electrode and ground shall be no more than 5 ohms.

ii Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and derived neutral points. Investigate point-to-point resistance values that exceed 0.5 ohms. Compare equipment nameplate data with the Contract Documents.

iii Inspect physical and mechanical condition.

iv Inspect bolted electrical connections for high resistance using one of the following two methods:

(i) Use a low-resistance ohmmeter to compare bolted-connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

(ii) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.

(4) Microprocessor-Based Protective Relay Field Tests:

(a) Visual and Mechanical Inspection:

i Record model number, style number, serial number, firmware revision, software revision, and rated control voltage.

ii Verify operation of LEDs, display, and targets.

iii Record passwords for each access level.

iv Clean the front panel and remove foreign material from the case.

v Check tightness of connections.

vi Verify that the frame is grounded according to manufacturer's written instructions.

vii Download settings from the relay. Print a copy of the settings for the report and compare the settings to those specified in the coordination study.

(b) Electrical Tests:

i Perform insulation-resistance tests from each circuit to the grounded frame according to manufacturer's published data.

ii Apply voltage or current to analog inputs, and verify correct registration of the relay meter functions.

iii Check functional operation of each element used in the protection scheme as follows:

(i) ANSI No. 2/62, Timing Relay:

- Determine time delay.
- Verify operation of instantaneous contacts.

(ii) ANSI No. 24, Volts/Hertz Relay:

- Determine pickup frequency at rated voltage.

- Determine pickup frequency at a second voltage level.
- Determine time delay.

(iii) ANSI No. 25, Sync Check Relay:

- Determine closing zone at rated voltage.
- Determine maximum voltage differential that permits closing at zero degrees.
- Determine set points of live line, live bus, dead line, and dead bus.
- Determine time delay.
- Verify control functions of dead bus/live line, dead line/live bus, and dead bus/dead line.

(iv) ANSI No. 27, Undervoltage Relay:

- Determine dropout voltage.
- Determine time delay.
- Determine time delay at a second point on the timing curve for inverse time relays.

(v) ANSI No. 32, Directional Power Relay:

- Determine minimum pickup at maximum torque angle.
- Determine closing zone.
- Determine maximum torque angle.
- Determine time delay.
- Verify time delay at a second point on the timing curve for inverse time relays.
- Plot the operating characteristic.

(vi) ANSI No. 46, Current Balance Relay:

- Determine pickup of each unit.
- Determine percent slope.
- Determine time delay.

(vii) ANSI No. 46N, Negative Sequence Current Relay:

- Determine negative sequence alarm level.
- Determine negative sequence minimum trip level.
- Determine maximum time delay.
- Verify two points on the I-two-squared-T curve.

(viii) ANSI No. 47, Phase Sequence or Phase Balance Voltage Relay:

- Determine positive sequence voltage to close the NO contact.
- Determine positive sequence voltage to open the NC contact (undervoltage trip).
- Verify negative sequence trip.
- Determine time delay to close the NO contact with sudden application of 120 percent of pickup.
- Determine time delay to close the NC contact on removal of voltage when previously set to rated system voltage.

(ix) ANSI No. 50, Instantaneous Overcurrent Relay:

- Determine pickup.
- Determine dropout.
- Determine time delay.

(x) ANSI No. 51, Time Overcurrent:

- Determine minimum pickup.
- Determine time delay at two points on the time current curve.

(xi) ANSI No. 64, Ground Detector Relay:

- Determine maximum impedance to ground causing relay pickup.

(xii) ANSI No. 67, Directional Overcurrent Relay:

- Determine directional unit minimum pickup at maximum torque angle.
- Determine closing zone.
- Determine maximum torque angle.
- Plot operating characteristics.
- Determine overcurrent unit pickup.
- Determine overcurrent unit time delay at two points on the time current curve.

(xiii) ANSI No. 87, Differential Relay:

- Determine operating unit pickup.
- Determine the operation of each restraint unit.
- Determine slope.
- Determine harmonic restraint.

- Determine instantaneous pickup.
- Plot operating characteristics for each restraint.

iv Control Verification:

(i) Functional Tests:

- Check operation of all active digital inputs.
- Check output contacts or SCRs, preferably by operating the controlled device, such as circuit breaker, auxiliary relay, or alarm.
- Check internal logic functions used in protection scheme.
- On completion of testing, reset minimum/maximum recorders, communications statistics, fault counters, sequence-of-events recorder, and event records.

(ii) In-Service Monitoring: After the equipment is initially energized, measure magnitude and phase angle of inputs and verify expected values.

(5) Ground-Fault Protection Field Tests: Evaluate the interconnected system according to switchgear manufacturer's written instructions.

(a) Determine the proper location of the sensors around the bus of the circuit to be protected. This determination may be done visually, with knowledge of which bus is involved.

(b) Verify the grounding points of the system to determine that ground paths do not exist that would bypass the sensors. Use high-voltage testers and resistance bridges.

(c) Test the installed system for correct response by application of full-scale current into the equipment to duplicate a ground-fault condition, or by equivalent means such as by simulated fault current generated by the following:

i A coil around the sensors.

ii A separate test winding in the sensors.

(d) Record the test results on the test form provided with the instructions provided by manufacturer.

(6) Switchgear components will be considered defective if they do not pass tests and inspections.

(7) Remove and replace defective units and retest.

(8) Prepare test and inspection reports. Record as-left set points of adjustable devices.

b. SYSTEM FUNCTION TESTS

(1) Switchgear will be considered defective if it does not pass tests and inspections.

(2) Prepare test and inspection reports.

c. FOLLOW-UP SERVICE

(1) Voltage Monitoring and Adjusting: After Substantial Completion, but not more than six months after Final Acceptance, and if requested by Owner, perform the following voltage monitoring:

(a) During a period of normal load cycles as evaluated by Owner, perform seven days of three-phase voltage recording at the outgoing section of each piece of switchgear. Use voltmeters with calibration traceable to NIST standards and with a chart speed of not less than 1 inch per hour. Voltage unbalance greater than 1 percent between phases, or deviation of phase voltage from the nominal value by more than plus or minus 5 percent during the test period, is unacceptable.

(b) Corrective Action: If test results are unacceptable, perform the following corrective action, as appropriate:

i Adjust switchgear taps.

ii Prepare written request for voltage adjustment by electric utility.

(c) Retests: Repeat monitoring, after corrective action has been performed, until specified results are obtained.

(d) Report:

i Prepare a written report covering monitoring performed and corrective action taken.

(2) Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove covers prior to inspection.

(a) After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of switchgear.

(b) Instrument: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C.

(c) Record of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used and that lists the results as follows:

i Description of equipment to be tested.

ii Discrepancies.

iii Temperature difference between the area of concern and the reference area.

iv Probable cause of temperature difference.

v Areas inspected. Identify inaccessible and unobservable areas and equipment.

vi Identify load conditions at time of inspection.

vii Provide photographs and thermograms of the deficient area.

(d) Act on inspection results according to recommendations in NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.

d. DEMONSTRATION

(1) Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain switchgear.

18. Motor Control Centers

a. FIELD QUALITY CONTROL

(1) Acceptance Testing Preparation:

(a) Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.

(b) Test continuity of each circuit.

(2) Tests and Inspections:

(a) Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

(b) Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

(c) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

(d) Perform the following infrared (thermographic) scan tests and inspections and prepare reports:

i Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multipole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.

ii Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multipole enclosed controller 11 months after date of Substantial Completion.

iii Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Submit calibration record for device.

(e) Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

(f) Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.

(3) MCCs will be considered defective if they do not pass tests and inspections.

(4) Prepare test and inspection reports.

b. STARTUP SERVICE

(1) Engage a factory-authorized service representative to perform startup service.

(a) Complete installation and startup checks according to NETA Acceptance Testing Specification and manufacturer's written instructions.

c. ADJUSTING

(1) Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload relay pickup and trip ranges.

(2) Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

(3) 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 amperes 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 Owner before increasing settings.

(4) Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage, solid-state controllers.

(5) Set field-adjustable circuit-breaker trip ranges

d. DEMONSTRATION

(1) Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers.

19. Post Energization Tests:

a. Load Tests:

(1) Immediately after initial energization, the Contractor shall complete all load tests and checks to include, but not be limited to, the following:

(a) Current checks on all applicable relays, meters, transducers, etc.

(b) Potential voltage checks on all applicable relays, meters, transducers, etc.

(c) Phase angle checks on all applicable relays, meters, transducers, etc.

(d) Phase rotation test on bus potentials.

20. Reports:

a. Report all test results in MS Word, MS Excel, electronic digital photograph, or PDF format to Engineer in a timely manner and within a week of final acceptance test completion.

CONTROLS INTERFACE

1. Contractor shall be responsible for controls interface with new and existing equipment:

   a. Communication interface will be via hard wired as well as Modbus TCP/IP with existing Emerson Process Ovation DCS system

   b. Contractor shall be responsible for procurement of all hardware required to accomplish such interfaces

   c. Responsible for procuring control engineering services such as graphic display, configuration of communication protocols, and testing.

   d. Responsible for adding or modifying existing display screens to depict new Unit 1 one line diagram, along with metering and breaker status indications

   e. Shall be responsible for communicating all required I/O points back to DCS

   f. Shall be responsible for conducting loop checks on all I/O points

   g. Responsible for performing full operational functional checks of all switchgear breakers and devices controlled via DCS

TEMPORARY SERVICE

1. During construction, critical loads must be temporarily powered. These loads are as follows:

   a. MCC-1C fed from Existing Switchboard

   b. Turbine Room Crane, fed from existing MCC-1A

   c. Lighting Transformer 1A fed from existing MCC-1A

   d. Critical Service transformer fed from existing MCC-1B

   e. Lighting transformer fed from existing MCC-1B

2. Give notice as required elsewhere in this specification of shutdown. Mount temporary 800A Iline panel within third floor work area and route temporary 800A service to Service Transformer 1. Shut down service transformer and cut over temporary loads to temporary panel for duration of shutdown, then cut over new Switchboard 1 and re-route critical loads to new Switchboard and MCC

3. Reference Drawing OK0463047-19 for more detail.

STEEL STRUCTURES (UNIT A)

1. The structures under Group A shall be provided by the Contractor and shall include and be in accordance with the following:

   a. Be in accordance with the intent of the drawings included at the end of these specifications.

   b. Be in strict accordance with the latest NEMA Standards SG6-36.01 to SG6-36.07 inclusive, except the maximum horizontal deflection of vertical members allowed under any loading case shall be limited to 1/100 of the span. The working design tensions shall be as shown on the plans.

   c. Consist of all structures including stands, pedestals, grounding mats, or other structural items required for a complete substation, not specifically covered in other items.

   d. Include all brackets and supports complete with mounting bolts for equipment to be furnished under these specifications and Owner-Furnished Material. Drilling and mounting holes shall be provided for:

      (1) Future equipment.

      (2) Connection to future structures.

      (3) Junction boxes, conduit supports, lighting, grounding, etc.

   e. All erection and equipment mounting bolts shall be provided with hexagon Type MF No. 1 locknuts. Nuts to be on inside face of steel with adequate space between the locknut and adjacent steel to allow use of socket type wrenches.

   f. Beveled washers shall be used on sloping or beveled surfaces where required to provide proper fit.

   g. Structural members shall be drilled for ground wire connectors and conduit supports as specified herein or indicated on drawings at the end of these specifications, or as shown by Engineer on approval drawing.

   h. All calculations used in designing the structures will be submitted to the Engineer for review prior to fabrication. A loading diagram for each structure shall accompany the calculations indicating loads applied, loading conditions, and resultant vector loads.

2. The structures shall be assembled in the shop to such an extent as to insure proper field erection.

   a. Reaming of unfair holes will not be permitted. A reasonable amount of drifting will be allowed in assembling.

   b. The structures shall be shipped to the site with all bridges, trusses, columns, end caps and plates, etc., completely assembled as far as is practical for shipment by truck. The shipment of the structure completely disassembled will not be acceptable.

   c. Wildlife ingress and egress is to be prevented by design and proper fit of structural steel with no openings permitted which would encourage a bird, reptile, or animal occupant.

3. All members or material shall be marked with the correct designation shown on the approved shop drawings.

   a. Marking shall be done by stamping the marks into the structural steel before painting or galvanizing, with numerals or letters of one-half inch (1/2") minimum height.

   b. Marking on structural steel shall be clearly legible after painting or galvanizing.

   c. Metal markings shall be circled or bracketed with black paint; provided, that anchor bolts and associated templates may be identified by tagging.

4. The structural and equipment arrangement drawings included with these specifications show the following:

   a. Typical arrangements applicable to sites unless specifically stated otherwise.

   b. Details to give intent of specifications. These details may be varied with the approval of the Engineer.

   c. Equipment jumpers, connectors, bus arrangements and clearances based on a particular manufacturer's equipment. Modifications and changes as approved by the Engineer shall be made as required to accept the particular equipment to be furnished.

5. All work shall be equal to the best modern practice in the manufacture and fabrication of materials of the types covered by these specifications, notwithstanding any omission from these specifications or drawings.

   a. Final inspection of the structures will be made by the Engineer who will mark and report all loose bolts and other errors in erection and will make sure that all bolts are in place and properly locked.

   b. All errors in fabrication or erection of structures shall be corrected by the Contractor at no additional cost to the Owner.

6. Structure erection shall conform to the following:

   a. No structure shall be erected on the foundations until at least seven (7) days after placement of the concrete foundations.

   b. All base plates are to be set level, directly on the foundation, and shall be given full and even bearing.

   c. Connection or erection bolts shall be entered clear to the head and installed with nuts to inside of the member. Allow two (2) threads minimum after lock nuts are in place.

   d. The structural nuts shall be tightened to a torque of 120 foot-pounds, and then locked into place with hexagon Type MF locknuts. Type MF locknuts will be used - no exceptions.

      (1) Each locknut shall be tightened sufficiently to flatten its concave face to full contact against the structural nut.

      (2) Only wrenches approved by the Engineer shall be used on the work, and the use of any wrench which may deform the nut or cut or flake the cadmium plating will not be permitted. After installing locknuts, bolts shall have two (2) full threads protruding.

(3) A reasonable amount of drifting will be allowed in assembling, but reaming for mismatched holes will not be permitted.

7. Structures shall conform to the following:

   a. Anchor bolts may vary in quantity and size with the approval of the Engineer. The size and quantity indicated on the drawings is for bidding purposes only. Anchor bolts shall be of the same size and symmetrically placed at all base plate legs per any unit structure. All anchor bolt patterns shall be square and symmetrically placed at all base plate configurations per any unit structure type regardless of height. All structural anchor bolts are created from threaded deformed bar such that “J-bolt” or “L-bolt” are not acceptable for any structure anchor bolt.

   b. Structures shall have a minimum amount of bracing as approved by the Engineer. The Structures are to be of rigid pin design rather than minimum material or hinged pin design with an excess of bracing required.

   c. Anchor bolt spacing for all structures, shall be as shown on the drawings, unless otherwise approved by the Engineer.

   d. Structures shall be uniform material and design throughout; i.e., interior frames and end frames shall be of the same strength, design, and material.

   e. Composite beam type of construction is not acceptable.

   f. Legs and beams for all structures will not be spliced without the approval of the Engineer. If the Engineer is convinced the splice is unavoidable, acceptable methods of splice will be submitted to the Engineer for approval.

8. Structures shall be constructed of square tubular, octagonal shaped plate, or standard wide flange members and the Contractor will be solely responsible for any increase in the concrete quantities to accommodate particular configurations other than those indicated on the drawings.

9. Adequate NEMA and NESC electrical clearances shall be maintained between adjacent equipment of a different phase and/or ground.

10. Structural steel shall conform to ASTM Designation: A36 except that Bessemer Process steel shall not be used and inspection of the material at the mill will be waived.

11. Anchor bolts and nuts shall be in accordance with ASTM Designation: A307.

    a. Anchor bolts shall conform to Grade A of this specification and shall be galvanized on the threaded end a minimum of twelve inches (12").

    b. The nuts shall be fully galvanized.

    c. Anchor bolts shall be furnished with black steel templates to facilitate correct placement for foundation installation. Templates and anchor bolts may be shipped in separate containers. Identification of which templates are with which anchor bolt is required by tagging, stamping, or full assembly.

    d. Anchor bolts shall be threaded deformed bar for all structural foundation connections thus “J” or “L” bent anchor bolts are rejected. However, “J” or “L” bent anchor bolts are acceptable for control house, control cabinet, battery cabinet, or other yard items, and as directed by Engineer.

12. Erection bolts and equipment mounting bolts shall be according to ASTM Designation: A307.

13. Locknuts and washers shall be galvanized when used to connect the steel structure.

14. Fabrication of structural steel shall be in accordance with the following requirements:

    a. Straightening material - Before being laid out or worked in any manner, structural material shall be straight and shall be cleaned of all rust and dirt. If straightening is necessary, it shall be done by methods that will not injure the metal or galvanized material coating.

    b. Shearing and cutting - Shearing and cutting shall be performed carefully and all portions of the work which will be exposed to view after completion shall be finished neatly. Blades shall be sharp and clearances adjusted to give smooth cuts. Manually guided cutting torches shall not be used.

    c. Holes - All holes in structural steel less than 13/16 of an inch thick (≤13/16”) may be punched to full size unless otherwise noted on the drawings. Holes shown on the drawings as drilled holes and all holes in structural steel 13/16 of an inch or more in thickness (>13/16”) shall be drilled or sub-punched and reamed to proper dimension. All holes shall be clean cut and without torn or ragged edges. All burrs resulting from punching, reaming, or drilling shall be removed with a tool making 1/16 inch bevel or chamfer. All holes shall be cylindrical and perpendicular to the member. Where necessary to avoid distortion of the holes, holes close to the points of bends shall be made after bending.

    d. Punching - For punching to full size, the diameter of the punch shall be 1/16 of an inch smaller than the nominal diameter of the die, but shall be not more than 1/16 of an inch larger than the diameter of the bolt. For sub-punching, the diameter of the punch shall be 3/16 of an inch smaller than the nominal diameter of the bolt and the diameter of the die shall not be more than 3/32 of an inch larger than the diameter of the punch. Sub-punching for reamed work shall be such that after reaming, no punched surface shall appear in the periphery of the hole and it shall be to the proper dimension. All burrs resulting from punching shall be removed with a tool making 1/16 inch bevel or chamfer.

    e. Reaming and drilling - Where holes are reamed or drilled, the diameter of the finished hole shall be not greater than the nominal diameter of the bolt plus 1/16 of an inch. All burrs resulting from reaming or drilling shall be removed with a tool making 1/16 inch bevel or chamfer.

    f. Accuracy of punching, reaming and drilling - All holes shall be spaced accurately in accordance with the drawings and shall be located on the gagelines. The maximum allowable variation in hole spacing from that indicated on the drawings for all bolt holes shall be 1/32 of an inch.

    g. Welding - All welding shall be performed in accordance with the latest edition of the "Structural Welding Code, 1972" with 1973 and 1974 revisions, as formulated by the American Welding Society. A shielded-arc-welding process shall be used. All welds shall be as shown on the drawings and shall be made in such a manner that residual shrinkage stresses will be reduced to a minimum. No stress-relieving treatment will be required. If not previously qualified, the welding process and the welding operators employed in performing the work covered by these specifications shall be qualified, in accordance with the American Welding Society Standard Qualification Procedure. All welds shall have full penetration through the material.

15. Cleaning and galvanizing of the structural steel shall be in accordance with the following:

    a. Cleaning - After the shop work has been completed and accepted, all material shall be cleaned of rust, loose scale, dirt, oil, grease, and other foreign substances. Particular care shall be taken to clean slag and spatter from welded areas.

    b. Galvanizing of plates and shapes - All plates, members, structures, and shapes shall be galvanized after fabrication, except that members of assemblies built up by welding may be galvanized before they are welded. All welds shall be coated and all galvanizing damaged by the welding operations shall be repaired as provided in Subparagraph "6.e." After being cleaned, all materials, except as noted on the drawings, shall be zinc-coated (galvanized) in accordance with ASTM Designation: A123. Where members are of such lengths that they cannot be dipped in one operation, great care shall be exercised to prevent warping. Finished compression members shall not have lateral variations greater than 1/1000 of the axial length between the points which are to be supported laterally. All holes in material shall be free of excess spelter after galvanizing.

    c. Galvanizing of hardware - Bolts, nuts, washers, locknuts, and similar hardware shall be galvanized in accordance with ASTM Designation: A153. Excess spelter or slag shall be removed by centrifugal spinning.

    d. Straightening after galvanizing - All plates and shapes which have been warped by the galvanizing process shall be straightened by being re-rolled or pressed. The material shall not be hammered or otherwise straightened in a manner that will injure its protective coating. If, in the opinion of the Inspector, the material has been harmfully bent or warped in the process of fabrication or galvanizing, such defects shall be cause for rejection.

    e. Repair of galvanizing - Material on which galvanizing has been damaged shall be redipped unless, in the opinion of the Inspector, the damage is local and can be repaired by applying a coat of zinc dust-zinc oxide paint. Where such repair is authorized, the damaged area shall be cleaned by wiping with clean rags saturated with mineral spirits or xylene, followed by hand steel-wire brushing. After wire brushing, the area shall be recleaned with solvent to remove residue, and shall be given one heavy brush coat of zinc dust-zinc oxide paint. Any additional holes drilled in the field will be likewise galvanized neatly. Any member on which the galvanized coating becomes damaged after having been dipped twice shall be rejected. The zinc dust-zinc oxide paint shall be in accordance with Federal Specification TT-P-C416, Type II.

16. Handling and transportation of structural steel shall be with care to avoid either bending or damage to the galvanizing.

    a. Pieces bent in handling may be used only if they can be straightened without injury to the galvanizing.

    b. Material on which the galvanizing has been damaged shall be redipped unless, in the opinion of the Engineer or Inspector, the damage is local and can be repaired in the field in accordance with the provisions of these specifications.

    c. Additional holes for grounding connections, conduit straps, junction boxes, etc. may need to be field drilled (See above 15 e.).

17. The Contractor shall be responsible for all costs incurred and time lost for steel which does not fit together properly in the field and for modifications necessary to steel that does not

perform satisfactorily when in place. This cost shall include return of faulty steel to the fabricator for modification or replacement.

BUS SUPPORTS AND INSULATORS - (UNIT A)

1. The bus support insulators shall be provided with the following features and ratings:

   a. All bus insulators shall be in accordance with the USA Standard C29 and the following for standard strength station post type insulators:

KV	BIL	Technical Reference Number	Leakage Distance
15	110 kV	225	15.5”
69	350 kV	278	72”

   b. Insulator buses and spacers shall be malleable iron, galvanized, and in accordance with ASTM Designation: A153.

2. All insulators and bushings shall be cleaned of oil, dirt, paper, tape, or other foreign materials. Any insulator or bushing having the surface glaze damaged in any way shall not be installed.

3. All insulators shall be ANSI-70 Gray.

SWITCHES AND DISCONNECTS - (UNIT B)

1. All switches and disconnects shall conform to sections of NEMA Standard SG-6 Power Switching Equipment. Where there is a discrepancy between the NEMA Standards and these specifications, then these specifications shall apply.

2. The switches and disconnects are provided with the minimum following features and ratings. See Unit description.

   a. Current Ratings

Cont. Amps	Momen. Amps
600	40,000
1200	61,000
1600	70,000

   Insulators shall conform to the bus insulator specifications.

   b. Main blades shall be equipped with adjustable self-aligning, high pressure contact. The current path shall not be through any spring or movable spring connections.

   c. The main blades of all switches shall be counter-balanced to prevent them from falling open or closed in any position.

   d. Switch shall be provided complete with direct control, proportional operating mechanism for manual or motor operation. The operator shall be complete with interphase pipes, including couplings, and adjustment assemblies, necessary

outboard bearings, guide bearings, and universal couplings. All ferrous parts shall be hot-dipped galvanized with bearing pins of corrosion resistant materials requiring no lubrication. The vertical operating pipe shall be supported by intermediate bearing brackets at a maximum of 10'-0."

e. Lever type operating switches may be used on manually operated switched 69 kV and below. Handles shall be 3’-6” above the foundation. Length of handle shall not exceed thirty six inches (36”) and the force required to operate the mechanism shall not exceed fifty (50) pounds.

f. Tinned copper braids shall be furnished for grounding of the switch handle to the substation steel for all group-operated switches. A clamp type cable terminal for No. 4/0 AWG minimum copper ground wire shall be provided for extending the ground wire down the support structure to the station ground grid, or switching platform as required. See Drawing ES – 1.

g. Switches shall be manufactured for use with specified insulators without the use of adapters; i.e., all switch parts will be manufactured with five inch (5") bolt circle.

h. The insulator skirts on all switches shall be assembled with the wider portion toward the structure.

i. Switches shall be adjusted to the Owner's satisfaction. Should difficulty be encountered obtaining this satisfaction, a manufacturer's field service engineer will be required to perform the proper adjustments. No piercing screws shall be set until the Owner has approved its operability after time sequencing test of each switch.

CONDUIT AND FITTINGS (UNIT K)

1. Conduits and supports shall comply with the latest edition of the National Electrical Code and be in accordance with the following:

   a. Conduit shall be installed in a neat and workmanlike manner. Avoid diagonal runs, crossovers, and spider web tangles. Conduit runs shall be straight and level with runs normal or parallel to the main structure lines.

   b. Supports for the conduit are required within three feet (3') of each outlet box, junction box, cabinet, or fittings. For straight runs, supports shall be provided at least every eight feet (8').

   c. A run of conduit between outlet and outlet, fitting and fitting or between outlet and fitting shall not contain more than equivalent of three quarter-bends (270-degrees).

   d. For below grade metallic conduit, as called for in the drawings and specifications, use rigid galvanized conduit. Underground metallic conduits shall be given two (2) protective coats of Bitumastic No. 50 or approved equal protection such as concrete duct system without rebar.

e. For above grade, rigid galvanized or aluminum conduit is acceptable. Aluminum conduit or fittings shall be of a low copper bearing alloy No. 6063, with lubricated threads. Round, flexible, nylon-covered tapes, or nylon ropes shall be used for fishing and wire-pulling in aluminum conduit.

f. All conduit fittings and boxes shall be Crouse-Hinds or approved equal, unless otherwise noted.

g. All flexible conduits shall be liquid-tight, Sealtite with "ST" series connectors or equal.

h. Below grade PVC conduit shall be Carlon Plastic Type 80, or an approved equal shall be used for underground installation with no part exposed above grade, i.e., above grade "stub-ups" or "risers" shall be rigid metallic conduit.

i. All hardware and accessory fittings shall be of a type designed, manufactured, intended, and appropriate for the use, and complement the items with which they are used, as approved by the Engineer.

j. All conduits shall have protective wire and cable bushings. All "stub-ups" or "risers" where conduit is not a continuous run from outlet to outlet or junction box to junction box shall have a grounding bushing on the unconnected end. The bushing shall be grounded directly to the station ground grid by a No. 4 AWG stranded copper cable.

WIRING DEVICES AND BOXES (UNIT K)

1. Wiring devices, junction boxes and outlet boxes, together with associated items shall be in accordance with the following:

   a. All surface mounted or exposed outlet boxes shall be cast aluminum or cast iron with gasketed steel or aluminum cover plates. Crouse-Hinds, Russell & Stoll, or similar approved types. Sheet metal boxes are not acceptable.

   b. Wiring devices shall be installed as shown on the plans. They shall meet UL requirements for ratings specified and comply with the latest revision of the National Electrical Code (See references “Standards, 1.”).

      (1) Switches (Specification Grade) shall be as follows:

         (a) Single Pole Hubbel No. 1221-1 or equal.

         (b) Three-way Hubbel No. 1223-1 or equal.

      (2) Receptacles (Specification Grade) shall be as follows:

         (a) Duplex (125 Volt) Hubbel No. 5252-1 or equal.

         (b) <u>All outdoor 120 Volt receptacles shall be G.F.C.I. (Ground Fault Current Interrupter)</u>

2. Junction boxes located throughout the substation for splicing and terminating points shall be heavy-duty, rain-tight, drop door, screw cover type enclosures of the sizes indicated

with rain-tight hubs on top as required. Connection in bottom shall be by two (2) locknuts. Boxes shall be Hoffman, NEMA Type 3R or approved equal, supplied without "knockouts."

a. Junction boxes shall be furnished and installed for the following devices:

(1) Potential Transformers.

(2) Current Transformers.

b. The physical location and internal layout shall be subject to the Engineer's approval. All potential circuits shall have secondary fusing and current circuits have short circuiting type terminal blocks installed in the cabinet.

c. Terminal blocks for wiring additions and modifications shall be:

	Four Point SC Type	Twelve Point
Buchanan	3B104	B112
Concentric Devices	30CT04	30TB12
Marathon Series	1600 SC	1500

d. All junction boxes shall be connected to the substation ground grid by a minimum of an AWG No. 4 stranded copper conductor with bolted lugs suitable for conductor size.

WIRE AND CABLE (UNIT K)

1. The control cable and wire shall be in accordance with the following:

a. Wire for indoor and outdoor above grade convenience receptacle shall be Type THW with stranded copper conductors; aluminum conductors are excluded in all cases. The wire shall be color coded as per Drawing ES–101 for project consistent wiring per the device connection diagram furnished by the Engineer.

b. Wire for above grade current and potential circuits in metallic conduit shall be multi-conductor control cables with outer jacket stripped away to provide proper color coding for various circuits. Circuit wiring shall be color coded as per Drawing ES–101 and per the device connection diagram furnished by the Engineer.

c. For above and below grade circuits and in cable trenches use multi-conductor control cable where No. 10 AWG conductors are required. For larger conductors, use multi-conductor Type USE-RHW or single conductor Type RHW with neoprene jackets (Type RR), as specified and shown in the drawings and the Cable Schedule. Where single conductor cables are used for a particular circuit, same shall be cabled together with suitable ties as approved by the Engineer. T&B Ty-Wrap is one of the suitable types.

d. Cables and/or single conductors will be organized neatly and grouped together with suitable ties as approved by the Engineer. T&B Ty-Wrap is one of the suitable types.

e. Control cables shall be multi-conductor, 7-strand copper with twenty (20) mils polyethylene and ten (10) mils of polyvinylchloride (PVC) on each conductor and PVC jacket overall, rated 600 Volt. Cable shall have full color code identification in accordance with ICEA Method 1 (See Drawing ES – 101) and shall be manufactured in accordance with latest applicable NEMA/ICEA Standards. All cables and/or single conductors will be organized neatly and grouped together with suitable ties as approved by the Engineer. T&B Ty-Wrap is one suitable type. Color coding shall be only by the color of the conductor jacket.

f. Low voltage power cable for direct burial shall be Type USE-RHW, 600 volt rated 75-degrees C, cross-linked polyethylene with copper conductors, all in accordance with REA Bulletin 61-3, Specifications for 600 Volt Underground Cable.

g. A twelve inch (12") sample of each size of the control cable, coaxial and power cable the Contractor proposes to use shall be submitted to the Engineer for approval. Any cable ordered before this approval is at the Contractor's own risk unless specifically approved by the Engineer.

2. Installation - All control cable and wire shall be installed in accordance with the following:

a. The Contractor shall install all cable in accordance with the drawings and requirements of these specifications and the NEC requirements where applicable.

b. Control cable, low voltage power cable, and switchboard wire shall not be spliced. Circuits shall be continuous from terminal to terminal.

c. Conductors in multi-conductor cables or single conductor cables in above grade or indoor conduit installations shall be identified by the color of the insulation. The schedule of color coding shall be as indicated in the drawings. In all cases, and AC circuit types, the neutral or grounded conductor shall be marked as per NEC requirements when other than white color coded insulation of a conductor is used. Also see color code schedules at the back of these specifications, Drawing ES – 101.

d. All control and low voltage terminals shall be terminated with ring terminals having at least two (2) indentations as approved by the Engineer. Terminations shall be made with pressure type terminal lugs using compression tool provided with ratchet or toggle mechanism that assures complete crimping before tool can be removed. Crimping tool(s) shall be approved by Owner. All lugs will be of the proper size for the associated wire.

e. Cables and conductors in the same circuit or grouping shall be assigned circuit numbers. The schedule circuit number shall be tabulated in a cable schedule.

The assigned circuit number shall be fastened to each cable or wire grouping at each terminal box or cabinet, entrance to switchboard, entrance to switchboard terminal block, and junction point by nylon identification tags as approved by the Engineer before the cable is pulled. Cable numbers shall be both clearly and indelibly marked in the tags.

f. Connections to devices will be per the connection diagrams furnished by the Engineer. AC, DC, current, and potential circuits will not be mixed within the same multi-conductor cable. Sufficient length shall be left at the ends of all cables to include all spare cables and/or conductors.

Current transformer cables shall have sufficient length to reach all current transformer blocks at the device cabinet and shall be routed to facilitate ease in changing ratios. Connections and cable or conductor routing shall be as approved by the Engineer.

g. Cable jackets will be stripped back to a minimum of six inches (6") from the conduit entrance to any device terminal cabinet and a minimum of six inches (6") inside of switchboard wire-ways. Cable number markings will be placed three inches (3") from the conduit entrance and (below/above) the wire-way on switchboards depending on point of entry.

h. All cable damaged in installation, cable of the wrong size or type, cable cut too short, etc., will be replaced solely at the Contractor's expense.

i. Wire for lighting circuits shall be continuous from outlet to outlet. No splice shall be made in outlet boxes. Leave at least six inches (6") of free conductor at each outlet to make splices or joints, except where it is intended to loop through sockets, receptacles, and other fixtures without splices or joints.

3. Cable Schedule:

a. The cable schedule included in the drawings is not intended to be complete, but merely act as a guide and to show intent of the specifications. Some circuits may need to be added, changed, or deleted. Any changes for convenience of the Contractor or due to unavailability of a certain size of cable shall be at no additional cost to the Owner. It is the responsibility of the Contractor to verify the length of all circuit runs.

b. Payment shall be made on actual installed footages at the per unit price for each type of cable.

POWER CONDUCTORS (UNIT K)

1. Power conductors specifications shall be as follows:

a. Jacketed, 1500 MCM copper conductor, EPR 133% insulation @ 220 mil minimum with copper shield tape or linear corrugated copper. See details below.

b. Jacketed, 1/0 AWG copper conductor, EPR 133% insulation @ 220 mil wall with copper shield tape. See details below.

c. Applicable to both power conductors:

(1) Completed cable shall be power rated 15 kV, 105-degree Celsius for applications in cable tray, conduit, and exposed to all weather related phenomena.

(2) Cable is to be installed at an Oklahoma Municipal Power Association generation station. It will be used in a "peaking" capacity meaning there are times cable will be fully loaded two-1500 kcmil cables per phase for approximately 30 MVA. There also be times of zero load due to lack of need to run unit. This up and down cycling are cause for grave concerns about moisture migrations from heating (under load) and cooling (zero load).

(3) Jacket shall be low smoke, non-halogenated, thermoplastic polymer approximately 110+|-3 mils thick meeting requirements of ICEA S-93-639 for type I with weather and particularly sun damage limiting capacity since some will be so exposed.

(4) Copper shield tape approximately 5+|-1 mils thick with 25%-45% overlap with moisture impasse barrier or adherence material. In the event moisture block is unavailable then shield shall be 8+2-1 mil longitudinal corrugated copper with minimum 0.25-inch overlap. Insulation screen shall be extruded semiconducting insulation meeting requirements of ICEA S-93-639/NEMA WC74 and S-97-682, AEIC CS8, plus UL 1072. Insulation shall be exclusively ethylene-propylene rubber (EPR) 220 mil minimum at 133%-0%+2%, meeting requirements of ICEA S-96-659/NEMA WC71 and UL 1072. Strand screen shall be extruded semiconducting material meeting requirements of per ICEA S-93-639/NEMA WC74 and S-97-682, AEIC CS8, plus UL 1072. Copper conductor shall be compact strand meeting requirements of ASTM B-496 except interstices filled with strand screen material meeting requirements of ICEA S-93-639/NEMA WC74 and S-97-682, AEIC CS8, plus UL 1072 as a means to deter water migration during cable service life.

CABLE TRAY (UNIT K)

1. Cable tray is a raceway consisting of troughing and fittings formed and constructed so that insulated conductors and cables may be readily installed or removed after the cable tray has been completely installed, without injury to either conductors, its insulation, or the jacket covering. A cable tray system is defined as a unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten and support electric power medium and low voltage cables and raceways. Contractor shall utilize AEIC CG5, Underground Extruded Power Cable Pulling Guide to install all cables whether in new cable trays or in existing cable trays.

See National Electrical Manufacturers Association (NEMA) documents for further information: ANSI/NEMA VE-1, Metal Cable Tray Systems and NEMA VE-2, Cable Tray

Installation Guidelines both are an industry resource in the application, selection, and installation of cable trays.

In cable tray use duct end-bells, raceway bushings, and rack saddles to prevent cable damage or abrasion. Ground all metallic raceways in generation plant building and in substation yard regardless of location. Only one splice be placed between support spans and, for long span trays, that splices ideally be placed at 1/4-span. As these cables are copper and are rather heavy, especially the 15 kV 1500 MCM copper at two per phase, weight; tray support of cable and its undamaged installation is of prime interest to Owner.

2. Cable tray specifications shall be as follows:

   a. Standard steel ladder cable trays with bottom open ladder type and supports with top open inside the generator building and top covered outside in the substation yard.

   b. Contractor shall utilize AEIC CG5, Underground Extruded Power Cable Pulling Guide to install all cables whether in new cable trays or in existing cable trays.

   c. Contractor shall use ANSI/NEMA VE-1, Metal Cable Tray Systems

   d. Contractor shall use NEMA VE-2, Cable Tray Installation Guidelines

   e. In cable tray use duct end-bells, raceway bushings, and rack saddles to prevent cable damage or abrasion.

   f. Ground all metallic raceways in generation plant building and in substation yard regardless of location.

   g. Only one splice shall be placed between support spans and for long span trays, those splices ideally be placed at 1/4-span.

   h. Ground cable tray at convenient locations at a minimum of every 50 feet.

   i. See Detailed Project Drawings.

CONCRETE (UNIT L)

1. **Work Included**

   a. Furnish all plant, labor, materials and equipment to complete all work in connection with the furnishing and installing of reinforced concrete shown on the plans or included herein, or both regardless of type whether pier, slab, pit, or stem-wall.

   b. The Contractor shall not allow water to accumulate under or near proposed structures and foundations during or after construction.

   c. Concrete and reinforcing steel shall be placed immediately after excavation and inspection of said excavation. In no event shall an excavation be allowed to remain open in excess of eight (8) hours.

d. The specification for Structural Concrete for Buildings, ACI Standard 301, will apply, except in case of conflict or discrepancy with the general plans, with Technical Specifications shall govern.

e. The Contractor shall furnish all unclassified size, quantity, type, etc., equipment, qualified labor, etc., necessary to construct the foundations and footings regardless of unclassified size, quantity, type, etc., rock, clay, sand, water, mud or any other material is encountered. The Contractor shall be totally responsible for successfully and skillfully furnishing, installing, etc., of the concrete foundations and footings. Extra charges for any reason shall be borne by the Contractor.

f. The construction drawings, included as a part of these specifications indicate footing and foundation sizes with particular dimensions for length, width, depth, anchor bolt spacing, etc. The Owner reserves the right to change any size and/or any quantity of any foundations and footings and to add and/or delete any foundations or footings.

The Engineer may find it necessary to change any or all of the dimensions shown on the drawings. The Engineer will issue final foundation details as “Issued for Construction” drawings prior to commencement of concrete work. Payment shall be made in accordance to the actual volume calculated by the Engineer per these “Issued for Construction” drawings or any subsequent revised drawings based solely on the dimensions of the footings or foundations to the nearest tenth of cubic yard. Payment shall be made solely at the unit bid price at time of bid.

2. **Materials**

The source and quality of the materials proposed for use under this contract shall be submitted to the Engineer for approval. If the materials conform to these specifications and are approved by the Engineer, no change in sources shall be made without prior written approval of the Engineer. (Costs of testing of new materials shall be borne by the Contractor.) The materials shall be in accordance with the following:

a. Portland Cement shall conform to the requirements of ASTM C-150 Type I unless otherwise directed in writing by the Engineer.

b. Aggregates shall conform to the requirements of ASTM C-33 as modified hereinafter.

c. Fine Aggregates shall consist of clean, sharp, well graded, natural sand.

d. Coarse Aggregates shall consist of clean, crushed stone, gravel, or a proper combination thereof, conforming to ASTM C-33.

Size No. 467 (Maximum Size = 1-1/2") shall be used where clearances permit and for a free fall of less than six feet (6') in depositing concrete, except where spacing of reinforcing steel is close, No. 67 aggregate shall be used.

Size No. 67 (Maximum Size = 3/4") shall be used where the free fall is six feet (6') or greater for depositing concrete, or for concrete pumping.

The quantity of coarse aggregate shall be at least fifty percent (50%) of the concrete mix by weight.

Washed or unwashed river rock is not an acceptable aggregate.

e. Water for Mixing and Curing concrete shall be from an approved source of supply.

f. Accessories shall be provided in accordance with the "Recommended Practice for the Use of Metal Supports" ACI-319, of the American Concrete Institute.

g. Admixtures shall be used in strict conformance with manufacturer's recommendations. Cement content shall remain unchanged; i.e., no reduction in cement content shall be allowed because of the use of any admixture.

Pozzolan admixture, "Pozzolith," or equal, if specified under Section No. C and No. W shall be used in all concrete mixes, in strict accordance with the manufacturer's recommendations, but not exceeding four (4) ounces per sack of cement; used without air entraining agent or two (2) ounces when air entraining agent is used.

Air Entraining Admixture of the neutralized vinsol resin type, such as "Aerolith," "MB-VR" or "Protex Air Entraining Agent," conforming to the requirements of ASTM Designation C-260 shall be used when so specified in concrete mixes.

Approved air entraining admixture shall be one-half (1/2) ounce per sack of cement unless deleted under Section No. C hereof.

h. Accelerators shall not be considered as an anti-freeze, but when used in the specified amount, the accelerated time of set of the concrete in cold weather is advantageous.

i. Retarding Admixture shall be hydroxylated carboxylic acid compound and shall delay the setting time of concrete at least twenty percent (20%) under laboratory test temperature conditions. The retarding admixture shall be a non-hygroscopic powder or concentrated liquid free from calcium chloride, foaming or air entrained admixtures. When its use is permitted, a retarding admixture shall be used in amounts required to meet the field conditions and in accordance with the manufacturer's recommendations, and the mix so proportioned without deviating from the water to cement ratio (water:cement).

j. Ready-Mixed Concrete shall comply with ASTM Designation C-94 and the National Ready-Mix Concrete Association Certified Standards.

k. Storage of Materials. All materials shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Any material having any deterioration, or which has been damaged, shall not be used in the work.

3. **Proportioning and Mixing**

Mix designs proposed for use shall be submitted to the Engineer for review. If the mix design is a unique mix, Contractor shall have an independent testing laboratory run tests and make recommendations as required. The mix shall be designed to produce the necessary work ability for fresh concrete and the required qualities in the hardened concrete. The materials shall be proportioned (by weight) to produce concrete having a MINIMUM compression strength at twenty-eight (28) days of 3500 psi. The materials shall be pro-portioned in the mix within the following limits:

Concrete Strength	With Pozz. and/or Air Slump	Min. Cement Per Cu. Yd.	Not to Exceed *Max. Gallons Water/Sack Cement
			Strength Requirement Governs
4000 psi	3 ± 1/2"	6.5 sacks	5-1/2 - 6*

*The maximum water per sack of cement includes the free water found in the aggregates, and shall be just enough to satisfy the water to cement (water:cement) ratio for obtaining the required compressive strength at twenty-eight (28) days.

For pumped concrete and for long hauls, use six (6) sacks cement per cubic yard, with Air-Entraining Agent, adding water to good workability, within due bounds of water to cement (water:cement) ratio for strength required. For pumping concrete, use ASTM No. 67 aggregate size, and any harshness of the Mix shall be especially avoided. Section W shall govern respective concrete for pump placement. Mix design for pumped concrete shall be submitted to the Owner for approval prior to incorporation in the project.

4. **On-The-Job Testing**

a. To ensure uniform production of concrete, representative samples will be taken at the request of and under the supervision of the Owner for the purpose of checking the slump and for making cylinders for strength tests.

b. The Contractor shall make available a standard slump test cone and accessories and furnish all required 6" x 12" test cylinder forms.

c. The Contractor shall pay all costs of an independent testing laboratory for compression testing of cylinders taken during concrete placing on this job.

d. Three (3) concrete test cylinders shall be made for each truckload of concrete used for any foundation work. One will be tested by an approved testing laboratory at seven (7) days, the second at twenty-eight (28) days of age, and the third to be tested only if a bad twenty-eight (28) day break is experienced.

e. The laboratory test reports shall be provided to the Owner and Engineer as soon as the test is completed. The reports shall be made by telephone, if other means of communication require more than two (2) days for the Owner to receive them.

f. A seven-day strength of 2,500 psi may indicate that the strength of the concrete is satisfactory at this age; however, the final acceptance of the concrete is based upon a minimum of 3,500 psi at twenty-eight (28) days.

g. The following table taken from the American Concrete Institute (ACI) should apply generally:

7 Day Strength = 35% of 28 day strength,
Cured at 40-degrees F.

7 Day Strength = 60% of 28 day strength,
Cured at 55-degrees F.

7 Day Strength = 75% of 28 day strength,
Cured at 73-90-degrees F.

7 Day Strength = 70% of 28 day strength,
Cured at 105-degrees F.

5. **Transmit Mixing Time**

All Ready-Mixed Concrete shall comply with ASTM Designation C-94 except as modified herein. The concrete shall be delivered to the site of work and discharge shall be completed within one-half (1/2) hour after introducing the water into the mixer for operation when temperature is 80-degrees F and above. The time may be increased to forty-five (45) minutes for operation during prevailing high temperatures under 80-degrees F but concrete working conditions may require the use of an approved retarding admixture at no added cost to the Owner. This admixture shall comply with ASTM Designation C-494 and be applied per manufacturer's recommendations.

a. Concrete shall be mixed only in quantities for immediate use. Concrete which has taken initial set shall not be re-tempered but shall be discarded and witnessed by the Owner's Inspector.

b. Indiscriminate addition of water to unload stiff concrete from the mixer drum is prohibited.

c. On long hauls where mixing time is approximately twenty (20) to thirty (30) minutes, when temperature approximates 85-degrees F or higher, an addition of water up to a positive maximum of two (2) gallons per cubic yard is permitted at the jobsite, provided that the specified twenty-eight (28) day strength requirement is not thereby impaired as the result of a violation of the proper water:cement ratio.

d. The water must be incorporated by additional mixing time of five (5) minutes. In concrete for all structural members, such as in beams, columns, girders and floors above grade, any addition of water above that permitted by the limitation on water to cement (water:cement) ratio must be accompanied by a quantity of cement sufficient to maintain the proper water to cement (water:cement) ratio. Such addition must be approved by the Owner or his authorized representative. The addition of cement need not apply to foundation slabs or pads, mass concrete blocks or floors on grade.

6. **Placing (Pouring) of Concrete**

Before the first batch of concrete is ordered out to the job site, every possible item, i.e., forms, re-bars placement and ties, bolt settings, etc., shall be checked and re-checked, so there shall not be any delay whatsoever in the unloading of the mixer trucks when they arrive.

a. The concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent the separation or loss of material and shall be deposited as nearly as practicable in its final position to avoid segregation due to handling or transporting. When concreting is once started, it shall be carried on

as a continuous operation until the section is completed, or until an approved construction joint is reached without ever permitting the previous batch to start taking its initial set under the next "pour."

b. Compaction of the concrete shall be made with a low amplitude internal vibrator operating at not less than 5,000 to 7,000 revolutions per minute. The vibrator head shall not be larger than one and one-half inches (1-1/2") diameter, nor held in any one spot longer than ten (10) to fifteen (15) seconds, but used throughout the fresh concrete only, especially next to forms and in all corners. Spading and rodding may be used in lieu of vibrators in some cases, but only with prior approval of the Owner or its Designee. A vibrator shall not be used to push concrete down a chute, nor in earthen forms where there is danger of caving earth. A spare vibrator shall be kept on the jobsite during all placing operations.

c. Contaminated, partially hardened, or re-tempered concrete shall not be used under any circumstances. Re-tempering means adding water after fresh concrete has time to start its initial set.

d. Where the free fall of concrete is greater than six feet (6'), a placing trunk shall be used to direct the concrete into place without hitting the form ties, or reinforcing steel, to prevent segregation of the coarse aggregate.

e. In weather above 80-degrees F, the Owner may require use of an approved admixture at no additional cost, to prevent possibility of "cold joints" between pours.

7. **"Cold" (Construction) Joints**

The placing of concrete shall be carried on continuously between cold joints, the location of which, if not shown on the plans, particularly if they are to occur in structural members, shall be definitely located only by the approval of the Owner and all reinforcement shall be continued across such joints with added keys or dowels as required by the Engineer.

Where possibly subjected to hydrostatic pressure from ground water, construction joints shall have embedded therein an approved water stop such as the PVC dumbbell type, very carefully cast in both sides of the joint by avoiding bending of the PVC material by the first covering of concrete thereon.

Before depositing new concrete on or against concrete that has hardened, the form shall be re-tightened, the surface of the hardened concrete shall be roughened as required, thoroughly cleaned of foreign matter and latence, and painted with "Uniweld" or equal epoxy resin in strict accordance with the manufacturer's instructions.

8. **Curing and Care After Placing**

Concrete shall be protected against injury from the elements and defacement of any nature during construction operations. Exposed surfaces shall be kept moist for at least seven (7) days after placing in summer - five (5) days spring and fall - four (4) days in winter; and shall be protected in cold weather as specified hereinafter. Moist burlap or a strong Kraft waterproof paper may be used to retain the moisture. Burlap coverings may be kept moist by sprinkling with a common garden sprinkler. When dry bulb temperature is not expected to rise above 85-degrees F, membrane curing compound ASTM C309 may be used.

9. **Forms**

a. Shall conform to the shapes, lines and dimensions shown on the drawings, and shall be adequate strength and tightness to support the fresh concrete without any bulging, sagging or any undue deformation and without loss of mortar.

b. Shall be properly braced and tied together to maintain their position and shape when concrete is tamped or vibrated. Any misshapen concrete resulting from sagging or bulging forms will not be accepted.

c. One inch (1") chamfer, but never less than three-fourths inch (3/4"), shall be provided on edges and corners of exposed concrete.

d. Forms for permanently exposed surfaces shall produce a smooth, even finish without fins or board marks.

e. No splashing of oil on forms will be allowed to touch reinforcing steel. Forms properly oiled with mineral oil shall be used in freezing weather in lieu of wetting with water.

10. Removal of Forms

a. Removal of forms shall be done in a manner that will assure complete safety of the structure and concrete.

b. Except for portions of horizontal structures supported on shores, the removal of wall forms, beam sides, and girder sides, columns, and similar vertical forms may be removed after twenty-four (24) hours, provided the concrete is sufficiently hard and will not be injured.

c. In no case shall the supporting forms and shaping be removed from beneath beams, girders, floor, and roof slabs or pan-type construction until the representative concrete cylinder tests indicate that the concrete has attained a compressive strength of 2,500 psi or better, and in no case not sooner than seven days (7 da.), after concrete is placed.

d. Clean all exposed concrete surfaces and all adjoining work stained by the leakage of concrete.

e. Surface defects that do not impair the structural strength shall be carefully cut out and refilled with fresh concrete. Cuts shall not be less than three-fourths inch (3/4") deep and thoroughly wetted just prior to filling with concrete of stiff consistency, and of a mix approximately the same as the adjoining work. After a partial set, compress and rub to reproduce a finish similar in texture and color to the adjoining work. Concrete having defects impairing the structural strength will not be accepted and are subject to removal and replacement at no additional cost to Owner.

f. Metal form ties extending from the face of the exposed concrete shall be cut off at least three-fourths inch (3/4") deep in the concrete immediately after removal of forms. Fill holes with a 1:3 cement to sand (cement:sand) ratio mortar approximately the same color as the adjoining concrete. Mix and place the mortar as dry as possible after wetting the surface and finish flush with adjoining surface.

11. **Exposed Surface Treatment (Rubbed Finished)**

All exposed concrete surfaces shall be treated immediately in less than one hour after removal of forms by one of the following methods. Exterior exposed concrete surface shall be so treated to one foot (1') below finished earth grade.

a. Smooth Rubbed Finish

Smooth rubbed finish shall be produced on freshly hardened concrete. All necessary patching shall have been done immediately after forms have been removed, and rubbing shall be completed no later than the following day. Surfaces shall be wetted and rubbed with carborundum brick or other abrasive until a uniform color and texture are produced. No cement grout or slush shall be used other than the cement paste drawn from the green concrete itself by the rubbing process.

b. Sand Floated Finish

The forms shall be removed before the surface has fully hardened. The surface shall be wetted and rubbed with a wood float by a uniform circular motion, with fine sand being rubbed into the surface until the resulting finish is even and uniform in color and texture.

c. Grout Cleaned Finish

After the concrete, still freshly hardened, has been pre-dampened, a slurry consisting of one (1) part cement (including Mix of ten percent [10%] of white cement) and one and one-half (1-1/2) parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats and allow to dry thoroughly. Surplus shall be removed by scraping and then rubbing with clean burlap. The finish shall be cured in an approved manner.

12. **Reinforcing Steel**

A complete set of shop drawings and setting diagrams for all reinforcing steel used on this project, together with lists of bars and bending diagrams, scheduling in detail every piece of reinforcing steel shall be submitted to the Owner and Engineer for approval in accordance with instructions in these specifications.

a. The Owner and Engineer will only generally check the shop drawings for size, spacing, special conditions, compliance with applicable codes, splices, construction joints, etc. Checking and approval of shop drawings, however, will not relieve the Contractor of sole responsibility for correctness of dimensions, quantities and all other details.

b. The Owner and Engineer shall be notified sufficiently in advance of the placing of concrete, for checking the precise location of re-bars, also foundation bolts, pipe and conduit locations, etc. No concrete shall be poured until everything is precisely checked.

c. Slab reinforcing bars shall be provided with chairs not more than six feet (6') center to center and not less than two (2) lines of chairs to any one (1) span. Provide high chairs for bent slab steel. Steel wire chairs shall be likewise used on the inside vertical face of all forms, securely fastened to reinforcing steel to keep all re-bars uniformly a minimum of two inches (2") to three inches (3”) from the form walls or earth.

d. Joist and beam reinforcing steel shall be supported on chairs. No concrete shall be poured until the reinforcement is inspected in place and approved by the Owner. In general, provide four (4) bar supports per joist or beam.

e. Metal reinforcement shall be accurately positioned and secured against displacement by using annealed wire of not less than No. 16 gauge or suitable clips at intersections and shall be supported in a manner that will keep all metal away from the exposed surface of the wall a minimum of two inches (2”).

f. Nails shall not be driven into the outside forms to support reinforcement nor shall any other device for this purpose come in contact with the outside form, except that wire chairs shall be inserted between the reinforcement and the outside form at intervals to maintain the required clear distance between the reinforcement and the inside and outside surfaces of the concrete. The clear distance between any bar and the weather side of all exterior walls shall not be less than two inches (2").

g. At all wall surfaces not exposed to the weather, a minimum of one and one-half inches (1-1/2") of concrete cover over all steel shall be provided.

h. Welded wire fabric designated as load carrying reinforcement shall have lapped splices so made that the overlap measured between outermost cross wires of each fabric sheet is not less than the spacing of the cross wires plus two inches (2"). It shall be supported as required for reinforcing bars. In lieu of adequate support for welded wire fabric, it shall be lifted during placing of concrete to ensure its proper position in the slab.

i. All reinforcing steel shall have a 60,000 psi yield point (or yield strength) and shall conform to the appropriate specifications as indicated:

1) Steel of 60,000 psi yield point - one of the following:

(a) Hard grade of "Specifications for Billet-Steel Bars for Concrete Reinforcement" (ASTM A615).

(b) Regular grade of "Specifications for Rail-Steel Bars for Concrete Reinforcement" (ASTM A616).

(c) Hard grade of "Specifications for Axle-Steel Bars for Concrete Reinforcement" (ASTM A617).

(d) Hard grade of "Specifications for Special Large Size Deformed Billet-Steel Bars for Concrete Reinforcement" (ASTM A615).

13. **Expansion Joints**

Reinforcement or other embedded metal items bonded to concrete (except dowels in floors bonded on only one [1] side of the joint), shall not be permitted to extend continuously through any expansion joint.

a. With exception of a uniform depth of three-fourths inch (3/4") from exposed surfaces, all expansion joints shall be filled with re-molded strips of "FLEXCELL" complying with ASTM D-1751 and Federal Specifications HH-F-341-a, Type 1, Class B. The above specification applies where not subjected to continuous vibration.

b. Where subjected to considerable or continuous vibration; as shown on the plans, the expansion joints shall be filled, except top three-fourths inch (3/4"), with

vibration absorbing synthetic sponge rubber type joint filler meeting ASTM D-1752 Type 1.

c. Expansion joint sealing compounds, for filling the remaining three-fourths inch (3/4"), shall be equal of "Allied Joint Seal" meeting Federal Specification SS-S-159-b. For horizontal joints, use No. 9020 (cold pour). For vertical joints use No. 9021 applied with "gun." The above is black in color. If a gray color is mandatory, then "THIOKOL" shall be used meeting Federal Specification TT-S-277-b (1), Type 1, pouring grade.

d. In masonry buildings, the use of "GE Silicone" caulking compound may be used on approval by the Owner. In such case, smoothing has to be done immediately and applied per instructions. See notes on drawings.

e. Where expansion joints may be subjected to hydrostatic pressure as indicated on the plans, water stops of the PVC “dumbbell” type, shall be carefully imbedded as specified herein for construction, "Cold" Joints. These joints are typical in oil containment vessels and pits where Contractor may use monolithic pour or cold joint and hydrostatic blocking materials as approved by the Engineer.

14. **Foundation Bolts and Pipe Settings**

a. Templates shall be provided for setting foundation bolts, sleeves, angles or plates to ensure precise location as indicated on the drawings. All contractors whose work must be supported by the concrete or whose work is related to the concrete placement shall be given ample notice and the opportunity to introduce and/or furnish imbedded items or templates and shall be responsible for checking the precision of their locations before concrete work is begun. Anchor bolts or templates shall not be welded or fastened to reinforcing steel.

b. The Contractor shall provide all connections and fasteners, sleeves, washers and accessories to ensure stability.

c. When setting anchor bolts, foundation bolts or other support items, the Contractor shall use hydraulic, non-metallic expansive cement mixed and applied in accordance with the manufacturer’s specifications.

15. **Waterstops and Other Items**

Any required expansion joint material, waterstops, and other embedded items shall be positioned most accurately and adequately supported against this placement during concrete placing operations. Voids in sleeves, inserts, and anchor bolts shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

Where possibly subjected to hydrostatic pressure from rain or ground water, construction joints shall have embedded therein an approved water stop such as the PVC dumbbell type, very carefully cast in both sides of the joint by avoiding bending of the PVC material by the first covering of concrete thereon.

16. **Repair of Surface Defects**

a. General

All tie holes and all repairable defective areas shall be patched immediately after form removal.

b. Defective Areas

All honeycombed and other defective concrete shall be removed down to sound concrete. The area to be patched and an area at least six inches (6") wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately one (1) part cement to one (1) part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream and shall then be well brushed into the surface.

The patching mixture shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two and one-half (2-1/2) parts sand by damp loose volume. White Portland Cement shall be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.

The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one (1) hour before being finally finished. The patched area shall be kept damp for seven (7) days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

c. Tie Holes

After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

Epoxy compounds such as "Uniweld" or approved equal for adhesion or as patching ingredients may be used in lieu of or in addition to the foregoing patching procedures. Such compounds shall be used in accordance with manufacturer's recommendations.

17. **Finishing Air-Entrained Concrete**

So there will be little or no "bleeding," the finishing of floors and other horizontal surfaces shall not have floating and troweling operations started until pressure from a man's foot will induce only a slight indentation or patting of surface does not attract moisture on palm of hand. All hand floating and trowel tools shall be of magnesium alloy. Most concrete finishers are, or should be, experienced in the specialized finishing methods for air-entrained concrete.

18. **Curing Monolithic Floors**

Curing:

a. Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist at least overnight. One of the following materials or methods shall be used:

1) Ponding or continuous sprinkling.

2) Absorptive mat or fabric kept continuously wet.

3) Sand or other covering kept continuously wet.

4) Continuous steam (not exceeding 150-degrees F) or vapor moist bath.

5) Curing compounds conforming to "Specifications for Liquid Membrane-Forming Compounds for Curing Concrete" (ASTM C309). Such compounds shall be applied in accordance with the recommendations of the manufacturer and shall not be used on any surfaces against which additional concrete or other cementitious finishing materials are to be bonded, nor on surfaces on which such curing is prohibited by the project specifications.

   In any case, Liquid Membrane curing compounds shall not be used when temperatures are expected to exceed 85-degrees F.

b. Final Curing

Immediately following the initial curing and before the concrete has dried, additional curing shall be accomplished by one of the following materials or methods:

1) Continuing the method used in initial curing.

2) Waterproof paper conforming to "Specifications for Waterproof Paper for Curing Concrete" (ASTM C171).

3) Other moisture-retaining coverings as approved.

c. Duration of Curing

The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is above 50-degrees F has totaled seven days (7 days). If high-early-strength concrete has been used, the final curing shall continue for a total of three (3) days. Rapid drying at the end of either curing period shall be prevented.

d. Formed Surfaces

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

e. Temperature:

When the mean daily temperature of the atmosphere is less than 40-degrees F, the temperature of the concrete shall be maintained between 50-degrees F and 70-degrees F for the required curing period. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. **SEE SECTION V - COLD WEATHER CONCRETE PLACING.**

f. Hot Weather

When necessary, arrangements for installation of windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering of a light color shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

g. Excessive Temperature Changes

Changes in temperature of the concrete shall be as uniform as possible and shall not exceed 5-degrees F in any one (1) hour or 50-degrees F in any twenty-four (24) hour period.

19. **Hot Weather Concrete Placing**

All concrete work done when the air temperature is 80-degrees F or forecast to rise above this temperature within twenty-four (24) hours after concrete placement shall be in accordance with the following:

a. Mixing water shall be kept cool. Storage tanks and supply lines shall be shaded or adequately insulated.

b. Aggregate stockpiles shall be saturated and the surfaces kept moist by intermittent sprinkling or by a continuous fog spray.

c. When temperature is above 85-degrees F and mixing time after introduction of water exceeds twenty (20) minutes, an additional two (2) gallons of water per yard may be used, permitting the additional water to control the slump within the range specified, or ice may be used as part of the mixing water, if chilled water is not available.

The amount of mixing water required to make one (1) cubic yard of concrete increases as the temperature of fresh concrete rises. If temperature is increased from 50-degrees F to 100-degrees F additional four (4) gallons are needed per cubic yard of concrete to maintain same slump.

d. Forms, reinforcing and subgrade surfaces shall be wet down just before concrete is placed. Wetting down of areas around the work is recommended.

e. The temperature of the concrete when placed shall not exceed 90-degree F. Ice in the mixing drums may be needed.

f. When approved in writing by the Owner a retarding admixture may be used for slowing down the setting time of concrete to allow for proper finishing.

20. **Cold Weather Concrete Placing**

All concrete work done on the job, in first case when the air temperature is between (freezing) 32-degrees F and 45-degrees F and is not forecast to go below 32-degrees F within twenty-four (24) hours, and in second case for placing concrete when the air temperature is below (freezing) 32-degrees F shall be in accordance with the following:

a. In either case:

1) Adequate equipment for heating the concrete materials shall be provided. Frozen materials shall not be placed in the mixer.

2) Heating the aggregate or the mixing water, or both, shall be done as required to keep the temperature of concrete at time of placement at a temperature not less than 50-degrees F, or greater than 80-degrees F

and 70-degrees F is preferred. When the water temperature is above 165-degrees F, the aggregate shall be pre-mixed with the water for one minute before cement is added. Cement shall not be mixed with water or aggregates having temperature above 120-degrees F.

3) Concrete shall not be placed on frozen subgrade or in frozen forms or handled in equipment containing ice or snow. The subgrade and forms shall be thawed out by the use of vented heating methods. (Open flame heating methods will not be permitted.) Small portable steam cleaning boilers are recommended as the best source of heat for curing concrete in cold weather.

4) During placing and finishing, the concrete shall be protected from wind to prevent heat loss and rapid drying, which causes surface cracking.

b. In the second case, when freezing temperature exists or is forecast within twenty-four (24) hours, or which may reasonably be expected within seventy-two (72) hours:

1) Concrete placement will not be permitted unless suitable and adequate facilities shall be provided on the job site prior to beginning concrete placement and shall be used for thawing forms, earth, sub-base and for maintaining the concrete at the temperatures set forth for the time as shown below.

Type I (normal) cement concrete - not less than 50-degrees F for five (5) days or 70-degrees for three (3) days.

Type III (high-early) cement concrete - not less than 50-degrees F for three (3) days or 70-degrees F for two (2) days.

2) Heating equipment, when used as specified, shall be operated continuously for the required time and the heating equipment shall have an attendant.

3) After the above specified heating is completed, the concrete temperature shall be reduced to air temperature by reducing the concrete temperature in increments of not more than 20-degrees F for each successive twenty-four (24) hour day. Concrete damaged by freezing will not be accepted.

4) During the entire protection period, adequate means shall be provided to prevent loss of moisture from the concrete surfaces.

DEMOLITION, GRADING AND SITE PREPARATION - (UNIT M)

1. The work required under this section consists of all demolition and removal of existing foundations as specified to complete the work indicated on the drawings and as specified herein, and generally listed as follows:

a. The Contractor is strongly urged to visit the site during the bidding period and:

(1) Examine requirements for any and all operations necessary to perform the work in accordance with the Specifications and Drawings.

(2) Complete all storm water runoff plans and silt prevention measures required to file with appropriate governing body a notice of intent to grade and method to constrain silt and runoff. Appropriate governing body could be federal, state, county, tribe, or city.

2. The Contractor shall be responsible for disposal of all debris, resulting from site preparation operations.

3. Area excavation shall be in accordance with the following:

   a. Perform excavation by any recognized method of good practice to complete the job in the most expeditious manner.

   b. Take precautions to insure no damages to existing facilities or equipment, or to other work.

   c. Excavation shall include all materials found within the designated limits for excavation.

   d. Excavate width adequately to permit efficient erection and removal of forms.

   e. Trim to neat lines where details call for concrete to be deposited against earth.

   f. Restore bottom of excavation to proper elevation with concrete in areas over-excavated as directed by the Engineer.

   g. Excavate by hand in areas where space and access will not permit use of machines.

   h. Notify Engineer immediately if suitable bearing is not encountered at the depth indicated on drawings. Do not proceed further until so instructed.

4. Sub-grade preparation shall be in accordance with the following:

   a. Excavate or backfill as required to construct subgrades to the elevations and grades shown on the drawings as approved by the Engineer.

   b. Place granular fill on compacted subgrade for concrete slabs to thicknesses as shown. Compact by rolling and tamping until firm.

STATION GROUNDING (UNIT O)

1. **General**

   The work required in this section consists of all material, labor, and equipment for a complete grounding system as indicated on the drawings.

   a. This construction unit shall consist of installing copper, below ground exothermic welding material, both properly sized and new or well-maintained molds used in the ground grid installation. Above ground connections may be bolted.

   b. After installation and testing is complete all above ground or visible ground wire shall be sprayed with ANSI 70 gray or galvanic paint then covered with welded sections of “C” channel or “Unistrut®” shaped ferrous metal in close proximity to each copper conductor and its attached structure in an attempt to prevent copper ground grid theft.

   c. The unit shall also consist of all electrical measurement, testing, logging, and reporting of measurements in writing of all ground bus, connectors, splices, taps, clamps, connections to all equipment, hardware, grates, gates, fence, control cabinet, etc. as described herein for structure grounding, fence grounding,

equipment grounding, grate grounding, and below grade grounding as shown on the Drawings.

d. See Detailed Specifications and Project Drawings.

2. **Materials**

a. Conductors shall be as follows:

1) 500 MCM, 37-strand, Soft drawn copper.

(a) All structure grounds not otherwise specified to be 250 MCM, 37-strand, soft drawn copper.

2) 500 MCM AWG, 37-strand, soft drawn copper.

(a) Power transformers, voltage regulators, circuit breakers, control cabinet cable tray and switchboards, etc., one (1) each at diagonally opposed corners.

(b) Surge arresters, current transformers, potential transformers, etc.

3) 500 MCM, 37-strand, soft drawn copper.

(a) 'HO' Bushing of Power Transformer.

b. Ground rods shall be 3/4" x 10'-0" copper-clad steel, Copperweld® or Engineer approved equal.

c. All sub-grade ground connectors shall be exothermic-welded, Cadweld®, Thermoweld®, Techweld®, and Ultraweld®.

d. All above grade ground connections are exothermic-welded, Cadweld®, Thermoweld®, Techweld®, and Ultraweld® except for equipment connections which may be bolted to the units.

e. All above grade ground connections for devices such as power transformers, interrupting devices, switchgear buildings, etc., which have a ground pad on the device shall be bronze, 2-hole or 4-hole NEMA terminals whichever device is so equipped, use Anderson Type SWL or Engineer approved equal.

f. All necessary grounding connectors and associated material for connections to the fence, corner posts, gate posts, gate frames, fence fabric, barbed wire, etc., shall be furnished as required and approved by Engineer.

g. After testing if grid resistance value is not acceptable to Owner or to Engineer then additional ground rods or grounding well or both may require installation by Contractor.

h. This substation requires four (4) new fifty-feet (50') minimum ground wells. See Project Drawings for details.

RELAYS, METERING, AND CONTROLS (UNIT Q)

The relaying systems provide the protection for GSU1 Replacement Project for the following items. The relays will be located in the 15 kV Switchgear and the stand alone relay cabinet.

1. Relay Cabinet

    a. The relay cabinet shall be steel construction with solid top sides and base. It shall have a solid steel door on the front and rear. It shall be free standing, 90” high, 36” wide, and 24” deep, similar to Hammond #1418YYD24. Its internals shall include a standard 19” rack positioned to provide 4” clearance between the rack and the front door, and shall have a vertical rail for mounting terminal blocks and provisions for vertical wire/cable management near the rear on each side. The relay cabinet shall include:

        1) Transformer Primary Relaying

        2) Overcurrent, Breaker, and Transformer backup protection functions

        3) Lockout Relays

        4) Breaker Control Switch

        5) Test Switches

        6) SCADA Equipment

2. Transformer Primary Relaying

    a. Differential protection

    b. The transformer requires differential protection against internal fault currents.

    c. This arrangement provides protection for all types of phase faults and ground faults. In this application, two sets of three-phase CTs are required, one set on the high-voltage side, another set on the low-voltage side.

    d. All CTs should be multi-ratio and should be reasonably matched in accuracy class.

    e. The SEL-387A contains a wide array of protective elements and control logic to protect two-winding power Auto-transformer. It includes current differential elements with percentage restraint and harmonic blocking elements, two optional sensitive restricted earth fault (REF) elements, and over current elements.

    f. Primary transformer protection shall be one (1) solid state differential relays for a two-winding transformer. Relays shall be 125 Volt DC.

        1) Horizontal rack Mount, 6 standard output, 6 inputs 2U.

        2) 125 Volt DC control voltage input.

        3) Configuration to be two-winding.

        4) Self-check alarm connected to the station annunciator.

        5) Man-machine interface.

        6) Phase O.C. range, 1-5 amps.

        7) Neutral O.C. range, 1-5 amps include 2 x REF elements.

        8) All special software options indicated by model number.

9) RS-232C Communications Port, 1 front, 2 rear

10) Differential Relay to be SEL 387A, Model # 0387A010HX4X341

3. Overcurrent, Breaker, and Transformer backup protection functions:

   a. The overcurrent, breaker, and transformer backup protection is provided by a separate over current relay SEL-351.

   b. The relay shall be an SEL model #035174C4E54XX1.

4. Lockout Relays

   a. There shall be two (2) lockout relays. One for transformer protection lockout and one for breaker failure lockout.

   b. Lockout relays shall be Electroswitch #78PB41D.

5. Breaker Control Switch

   a. The breaker control switch shall be an Electroswitch model No. 24PB41D.

6. Test Switches

   a. Test switch for the SEL 387A (TS1, TS2, & TS3) shall be an ABB 19R model No. FR3G018014297

   b. Test switch for the SEL 351 (TS4, TS5, & TS6) shall be an ABB 19R model No. FR3G018001297

   c. Test switch for the lockout relays (TS7, TS8, & TS9) shall be an ABB 19R model No. FR3GQ06001Q06

7. SCADA Equipment

   a. RTAC for communication and control shall be an SEL 3530-4, Model No. 35304PA0XX211X0XXXXXX.

   b. Satalite Clock shall be a SEL 2407, Model No. 24070001B.

8. 15 kV Switchgear (Owner Furnished)

   a. The 15 kV Switchgear is owner furnished and interfaces with the protection provided in the relay cabinet.

   b. The 15 kV Switchgear of two (2) 15 kV breakers and one (1) 15 kV disconnect switch. The equipment is enclosed in a metal, indoor cabinet.

      1) Breaker #1 is the Generator Breaker. It is rated at 1600 A.

      2) Breaker #2 Is the breaker to the Aux. Transformer #1. It is rated 600 A.

      3) The 15 kV disconnect switch provided a disconnect from the Generator #1

   c. Breaker #1 and Breaker #2 are provided with one SEL 351 (model number SEL 035174C4E54XX1). The breakers and bus shall be provided with devices to detect and take appropriate action against the effects of the following conditions:
      1) Phase faults
      2) Ground faults
      3) Overloads
      4) The breakers shall provide a synch-check function at the relay.

5) The breakers shall provide the capability to monitor undervoltage through the protective relay.
6) The breakers shall provide the capability to monitor a potential transformer failure.
7) All breakers shall monitor Amps, Volts, Watts, VARS, Frequency, Watt-Hours, and PF through the protective relays.

d. Each breaker shall have a lock-out relay (model number Electroswitch #78PB03E) as shown on the single line diagram. Each lockout relay shall meet the following requirements:
1) A red supervise and green trip LED lights shall be provided integral to each lockout relay.
2) Contacts on each lockout relay to operate the lights indicated above and performing tripping and alarm functions shall be provided.
3) A minimum of two spare “a” and “b” contacts shall be provided for each lockout relay.

e. Test switches, as described below, shall be provided for the secondary terminals of current and potential transformers.
1) Test switches shall be 10 pole with red handles for trip and alarm poles.
2) Switches shall be door-mounted and accessible when the door is closed shall have clear polymer covers and shall be capable of remaining in the open position with the cover in place.
3) Terminals shall be electrically and mechanically suitable for use with copper conductor cables.
4) Current transformer terminal blocks shall be the “short circuiting” type.
5) Test switch model numbers: ABB FT! #C129A514G01 and ABB FT1 #C670B197G36

9. Generator protection:

a. Generator protection is provided by Breaker #1 in the 15 kV switchgear.

b. Existing protection located in the control room will remain and interface with the new protection

480 VOLT SWITCHGEAR (UNIT U)

Upon delivery of the 480 Volt switchgear, the following procedure shall be followed for installation.

1. EXAMINATION

a) Examine areas and space conditions for compliance with requirements for secondary unit substations and other conditions affecting performance of the Work.

b) Examine roughing-in of conduits and grounding systems to verify the following:

(1) Wiring entries comply with layout requirements.

(2) Entries are within conduit-entry tolerances specified by manufacturer, and no feeders will have to cross the section barriers to reach load or line lugs.

c) Examine walls, floors, roofs, and concrete bases for suitable conditions where switchgear will be installed.

d) Verify that existing connections are in place and functional. Maximum ground resistance shall be five ohms at the switchgear location.

e) On delivery of switchgear and prior to unloading, inspect equipment for damage.

(1) Verify that tie rods and chains are undamaged and tight, and that blocking and bracing are tight.

(2) Verify that there is no evidence of load shifting in transit, and that readings from transportation shock recorders, if equipped, are within manufacturer's written instructions.

(3) Examine switchgear for external damage, including dents or scratches in doors and sill, and termination provisions.

(4) Compare switchgear and accessories received with the bill of materials to verify that the shipment is complete. Verify that switchgear and accessories comply with manufacturer's written instructions and Shop Drawings. If the shipment is incomplete or does not comply with Project requirements, notify manufacturer in writing immediately.

(5) Unload switchgear, observing packing label warnings and handling instructions.

(6) Open compartment doors and inspect components for damage or displaced parts, loose or broken connections, cracked or chipped insulators, bent mounting flanges, dirt or foreign material, and water or moisture.

f) Handling:

(1) Handle switchgear, according to manufacturer's written instructions; avoid damage to the enclosure, termination compartments, base, frame, tank, and internal components. Do not subject switchgear to impact, jolting, jarring, or rough handling.

(2) Protect switchgear compartments against the entrance of dust, rain, and snow.

(3) Transport switchgear upright, to avoid internal stresses on equipment mounting assemblies. Do not tilt or tip switchgear.

(4) Use spreaders or a lifting beam to obtain a vertical lift and to protect switchgear from straps bearing against the enclosure. Lifting cable pull angles may not be greater than 15 degrees from vertical.

(5) Do not damage structure when handling switchgear.

g) Proceed with installation only after examinations are complete and unsatisfactory conditions have been corrected.

2. INSTALLATION

a) Install switchgear to comply with manufacturer’s recommendation. Refer to OK04634047-19.

b) Comply with requirements for vibration isolation and seismic-control devices.

c) Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

3. CONNECTIONS

a) Ground equipment according to specification in STATION GROUNDING (UNIT O).

b) Terminate all grounding and bonding conductors on a common equipment grounding terminal on the switchgear enclosure. Install supplemental terminal bars, lugs, and bonding jumpers as required to accommodate the number of conductors for termination.

c) Complete switchgear grounding and surge-protector connections prior to making any other electrical connections.

4. IDENTIFICATION

a) Install warning signs as required to comply with OSHA 29 CFR 1910.269.

MOTOR CONTROL CENTER (UNIT U)

Upon delivery of the Motor Control Center, the following procedure shall be followed for installation.

1. EXAMINATION

a) Examine areas and surfaces to receive MCCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

b) Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

a) NEMA Industrial Control and Systems Standards: Comply with parts of NEMA ICS 2.3 for installation and startup of MCCs.

b) Floor Mounting: Install MCCs to comply with manufacturer’s recommendation. Refer to OK04634047-19.

c) Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

d) Install fuses in each fusible switch.

e) Install fuses in control circuits if not factory installed.

f) Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

g) Comply with NECA 1.

2. IDENTIFICATION

a) Operating Instructions: Frame printed operating instructions for MCCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of MCCs.

3. CONTROL WIRING INSTALLATION

a) Install wiring between enclosed controllers master terminal boards and remote devices.

b) Bundle, train, and support wiring in enclosures.

c) 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 within 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.

4. CONNECTIONS

a) Drawings indicate general arrangement of conduit, fittings, and specialties.

b) Ground equipment according to specification in STATION GROUNDING (UNIT O).

PROTECTION WALL (UNIT V)

1. DESIGN CRITERIA

    a. Governing Building Codes

        1) IBC 2015 International Building Code

2. FOUNDATION

    a. A geotechnical report with recommendations for this project has not been provided. Foundations have been designed in accordance with the minimum specified bearing values for soil types CL, ML, MH, AND CH per Chapter 17 of the IBC.

    b. The foundation design shall be verified by the engineer of record pending recommendations from the geotechnical engineer.

    c. Drilled Piers:

        1) Pier design parameters: drilled piers have been designed for a maximum allowable pressure of 1500 PSF at a minimum penetration of 8'-0" below finished grade.

3. REINFORCED CONCRETE

    a. Cast-in-place concrete shall have a minimum 28 day compressive strength (f'c) of 4000 PSI.

    b. Concrete to be normal weight concrete (150 PCF), CLASS AA, with cement conforming to ASTM C150, TYPE I OR II.

    c. Continuous reinforcing bars to be turned and lapped at corners and intersection of walls and footings. Hooked bars to have standard ACI hooks unless noted otherwise.

    d. Concrete shall be properly vibrated during placement.

    e. All contact surfaces, new or existing, at construction joints shall be intentionally roughened to 1/4" amplitude prior to casting adjacent pour.

    f. Concrete Walls:

        1) See plan and details for thickness and reinforcing of concrete walls.

        2) Provide horizontal corner bars at all corners. Use same size bar and spacing as the horizontal reinforcing.

        3) Horizontal reinforcing shall terminate at the ends of walls and at openings with a standard hook.

        4) When two curtains of steel are required, the spices in the horizontal reinforcing of each curtain shall not occur at the same location.

TRANSMISSION LINE (UNIT W)

1. Steel Poles

   a. The steel specification in UNIT A shall be used for manufacture of steel poles.

   b. The following information shall be used in procuring the two steel poles, Structures #2 and #5. Structure 2 is a double deadend, near 90-degree angle, while structure 5 is an inline double deadend with full tension one-way and slack span the other while a 69 kV, 1200 A GOAB switch is mounted to pole.

   c. For Loading Trees, see Attachment A – Loading Trees Steel Structures #2 and #5.

2. Transmission Hardware

   a. Recommended manufacturer catalog numbers shown on the TM drawings. With Engineers approval other manufacturers catalog numbers may also be acceptable.

3. Wood Poles

   a. Pole Inspection, Handling, and Distribution

      1) The Contractor shall immediately notify the Supplier of freight damage to poles. The framing, boring, and gaining, if required, must agree with the Pole Framing Details for the specific structures to be erected.

      2) The pole lengths and classes shall agree with the Pole Units specified for the structures to be erected, as tabulated in the Transmission Construction Units and shown on the plan and profile drawings.

      3) Poles shall be handled with care so as not to damage the wood or preservative treatment. Poles shall be lifted off of the pole hauler at designated structure locations. They shall not be rolled or dragged along the ground. Lifting slings shall be used and shall be fabricated from a material that protects the wood from damage. Pole tongs are not permitted when handling poles.

      4) If poles are stored after delivery, they shall be carefully arranged and placed on wide blocking to prevent crushing. No pole shall come in contact with standing water or the ground. No pole will have an unsupported length greater than 20 feet. The blocking shall be provided by the Contractor and included in this unit price.

      5) The contractor shall distribute extra heavy, choice, close-grained poles to angle, deadend, and crossing structures.

   b. Field Drilling and Treating

      1) All filed drilled holes shall be thoroughly treated with a heavy application of preservative compound. The Contractor shall include any required filed drilling and treating in the unit cost for pole top assemblies.

2) Unused holes or holes that are mis-drilled shall be plugged prior to erection using treated wood dowel pins three inches (3”) in length. When a hole is mis-drilled, the Engineer shall be notified. A pole will be rejected by the Engineer if two or more mis-drilled holes occur at a connection. If a pole is rejected due to mis-drilling of holes by the Contractor, the Contractor shall replace the damaged pole at no additional cost to the Owner.

3) Double crossarm spacer fittings, if required, are indicated in the List of Materials on the transmission line structure drawings. Fixed spacers shall be used with factory gained and treated poles. Adjustable spacers shall be used with ungained and treated poles. The gaining of poles, and the type of crossarm spacers are as follows:

____Factory gained and treated poles for fixed spacer fittings.

____Ungained and treated poles for adjustable spacer fittings.

X__ Structure with double crossarms are not required.

4) Poles may be supplied with flat or 15 degree sloping roofs. Top of poles shall not be cut except with the expressed approval of the Owner. If cutting is deemed necessary, the pole top shall be cut off at a slope of 15 degrees, thoroughly treated with preservative approved by the Engineering, and covered with a mastic type cap. Poles are to be supplied with:

____Flat roofs.

X___ 15 degree sloping roofs.

____Contractor’s option.

5) Under no circumstances shall the butt of any pole be cut.

c. Special Requirements

1) Poles shall be supplied under the requirements and specifications of the latest version of RUS BULLETIN 1728F-700, REA Specification for Wood Poles, Stubs and Anchor Logs.

2) Poles and shall be inspected in accordance with the latest version of RUS Bulletin 1728H-702, REA Specification for Quality Control and Inspection of Timber Products.

DRAWING LIST

EXISTING FACILITY DRAWINGS

Drawing Number	Description
B-7	Boiler Foundation and Slab Plan and Details
B-8	Main Building Piers, Beams & Details
E-11	Aux. Bus Main Circuit Breaker CS
E-12	MCC 1-A Supply Breaker control Schematic
E-13	MCC 1-B Supply Breaker Control Schematic
E-14	Boiler Feed Pump 1-A Control Schematic
E-15	Boiler Feed Pump Recirc. Valves ABV-105 & ABV-116 CS
E-18	Circulating Water Pumps 1A & 1B CS
E-19	Circulating Water Valves 1A & 1B CS
E-20	Auxiliary Oil Pump CS
E-21	AC Bearing & Seal Oil Pump CS
E-22	Emergency Bearing & Seal Oil Pump CS
E-23	Turning Gear Drive CS
E-24	Gland Seal Vacuum Pump CS
E-25	Oil Tank Vapor Extractor CS
E-26	Bearing Drain Enlargement Vapor Extractor CS
E-30	Condensate Pumps 1A & 1B CS
E-37	Circulating Water Booster Pumps 1A & 1B CS
E-38	480 V System Ground Indication Schematic
E-39	Ventilation Fan CS
E-41	Control Room A.C. Air Handling Unit CS
E-50	Physical Phasing Diagram
E-60	Single Line Diagram
E-65	Electrical Grounding Grid Location
E-66	Plan I-I” Ground Floor Equipment, Conduits & Cable Trays
E-67	Plan “2-2” Heater Floor Equipment, Conduits & Cable Trays
E-68	Plan “3-3” Operating Floor Equipment, Conduits & Cable Trays
E-69	Plan “4-4” Deaerator Floor, Roof, Equipment & Conduits

GENERAL DRAWINGS

Drawing Number	Description
ES – 1	Grounding Details – Switch Operator Platform/Structures
ES – 12	Standard Nameplates
ES – 21	Typical Equipment Details – Conduit, Buried PVC and Grounding
ES – 25	Typical Equipment Details – Phase Conductor and Static Deadend
ES – 27	Typical Equipment Details – Grounding/Surge Arresters and Instrument Transformers
ES-50	Ground Well for Substation Grids
ES – 101	Color Coding of Control Cable
ES – 102	Grounding Detail Connections
PK-1	Pole Keys
TM-1	Polymer Insulators Deadend
TM-3	Horizontal Post Insulator with Clamp
TM-4(T)	OHGW Assembly (Deadend and Tangent)
TM-6	OHGW Double Bolt
TM-9	Pole Ground and Butt Wrap
TM-9S	Steel Pole Structure Ground
TM-60	Structure Number
TM-101	Pole Backfill

PROJECT DRAWINGS

Drawing Number	Description
OK04634047 - 01	One Line Diagram
OK04634047 - 02	Overall Plan View of Site and Equipment Locations
OK04634047 - 03	Plan View of Equipment Locations
OK04634047 - 04	Structure Profile View
OK04634047 - 05	High Side Structure Profile View
OK04634047 - 06	Breaker High Side Structure Profile View
OK04634047 - 07	Transformer High Side Structure Profile View
OK04634047 - 08	Low Side Structure Profile View
OK04634047 - 09	Bridge Ramp & New Cable Tray
OK04634047 - 10	Foundation Arrangement & Conduit Routes
OK04634047 - 11	Foundation Details - Transformer and Breaker ("B" & "C")
OK04634047 - 12	Foundation Details - "A" "D" & "E"
OK04634047 - 13	Foundation Details - Transmission Line Poles
OK04634047 - 14	Protection Wall Plan and Details
OK04634047 - 15	Grounding Layout Plan
OK04634047 - 16	Oil / Water Separator Detail
OK04634047 - 17	Cable Tray Route and Expansion
OK04634047 - 18	Demo Existing MCC-1 A MCC-1B and Switchgear
OK04634047 - 19	Install MCC-1 and 480 V Switchgear
OK04634047 - 20	480 V Switchgear And Feeder Schedule
OK04634047 - 21	Transmission Line Alignment and Structures
OK04634047 - 22	Polehead Detail - Structures 1 and 6
OK04634047 - 23	Polehead Detail - Structures 2 and 5
OK04634047 - 24	Polehead Detail - Structures 3 and 4
OK04634047 - 25	Relay Panel
OK04634047 - 26	15 kV Switchgear Layout
OK04634047 - 27	Conduit Routes
OK04634047 - 28	Existing Concrete Removal in Substation Area

Attachment A – Loading Trees Steel Structures #2 and #5

Structure 2 70' Steel Pole with 87-deg angle phases /w Double DE on Pole Vangs thru pole:

70-feet /w concrete pier fdn
/w ~87-deg ang cond DDE to Pole

Case 1
Max Loads
No Factors
DE conductors to Pole
NOT Switch Frame
No Ice

Plan View

70-feet /w concrete pier fdn
/w ~87-deg ang cond DDE to Pole

Case 2
Resultant
No Factors

No Wind
No Ice

Sheet 1 Str 2

Notes:

1 Anchor Bolts to be straight deformed bar as "L" or " J" shape are not acceptable.
2 Deadend on pole vangs and vangs to be through pole (for future use)
3 See Detail Drawings

Structure 2 70' Steel Pole with 87-deg angle phases /w Double DE on Pole Vangs thru pole:

Structure 2 70' Steel Pole with 87-deg angle phases /w Double DE on Pole Vangs thru pole:

70-feet /w concrete pier fdn
/w ~87-deg ang cond DDE to Pole

Case 5
Tension
/w Overload Factor
No Ice
No Wind

70-feet /w concrete pier fdn
/w ~87-deg ang cond DDE to Pole

Case 6
60-degree Ambient
Tension

Transverse=

Structure 5 70' Steel Pole, Conductors Double Deadended on Pole Vangs through pole:

Case 1
Max Loads
No Factors
DE conductors to Pole
NOT Switch Frame

Case 2
Resultant
No Factors
DE conductors to Pole
NOT Switch Frame

Plan View

Notes:

1 Anchor Bolts to be straight deformed bar as "L" or " J" shape are not acceptable.
2 Deadend on pole vangs NOT on SWITCH frame.
3 See Detail Drawings

Structure 5 70' Steel Pole, Conductors Double Deadended on Pole Vangs through pole:

70-feet /w concrete pier fdn
/w Switch 2' below cond DE to Pole

Case 3
40 mph Wind=4#/ft^2
With Factors
with ICE 0.50 radial
Transverse=

70-feet /w concrete pier fdn
/w Switch 2' below cond DE to Pole

Case 4
~48 mph Wind=6#/ft^2
With Factors
No Ice
Transverse=

Structure 5 70' Steel Pole, Conductors Double Deadended on Pole Vangs through pole:

70-feet /w concrete pier fdn
/w Switch 2' below cond DE to Pole

Case 5
Tension
/w Overload Factor
No Ice
No Wind

70-feet /w concrete pier fdn
/w Switch 2' below cond DE to Pole

Case 6
60-degree Ambient
Tension

Transverse=