CONTRACT DOCUMENTS
FOR
THE CONSTRUCTION OF

Toledo Bend Project Spillway Electrical Improvements

Prepared for
Sabine River Authority of Texas
Sabine River Authority, State of Louisiana

March 2023

ISSUE FOR BID
RFB 23-002

STATE OF TEXAS
JEFFREY N. HENSLEY
84677
LICENSED
PROFESSIONAL ENGINEER

03-23-2023

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

STATE OF LOUISIANA
JEFFREY NELSON HENSLEY
License No. 46887
PROFESSIONAL ENGINEER

03-23-2023

FREESE AND NICHOLS, INC.
LA REGISTERED
ENGINEERING FIRM
E.F- 000341

PREPARED BY:
FREESE AND NICHOLS, INC.
LA REGISTERED ENGINEERING FIRM E.F- 0000341
TEXAS REGISTERED ENGINEERING FIRM F-2144
801 CHERRY STREET SUITE 2800
FORT WORTH, TEXAS 76102

FNI Project No: SRA19480

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SEAL SHEET

Division: 00, 01, 09, 26, 40

03/23/2023

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Division 05

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DIVISION 00

PROCUREMENT AND CONTRACTING REQUIREMENTS

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NOTICE TO BIDDERS
Toledo Bend Project Spillway Electrical Improvements

Sealed proposals addressed to the Sabine River Authority of Texas and Sabine River Authority, State of Louisiana will be received at the Toledo Bend Project Joint Operation (TBPJO) Administrative Office located at the Toledo Bend Dam site on F.M. 692, 450 Spur 135, Burkeville, Texas 75932, until **2:00 PM (Central Time)**, **Wednesday, May 17, 2023**. The proposals will immediately thereafter be publicly opened and read aloud. Proposals received after this time will be returned unopened. Address proposals to Mr. Don Iles, Toledo Bend Division Administrator.

Advertisement and bid phase information for the Project can be found at the following web site: https://www.civcastusa.com

Contract Documents may be downloaded or viewed free of charge at this web site. It is the downloader's responsibility to determine that a complete set of documents, as defined in the instructions to Bidders are received. Printed copies of the Contract Documents may be purchased at the website for the cost of printing. The cost for printed Contract Documents is non-refundable.

This web site will be updated periodically with addenda, planholders lists, bid tabulations, additional reports or other information relevant to bidding the project.

The Contract Documents can also be examined without charge at the TBPJO Administrative Office.

A **mandatory** pre-bid conference for the project will be held on **Wednesday, April 19, 2023 at 10:00 AM (Central Time)** at the TBPJO Administrative Office in Burkeville, Texas. A mandatory site visit of the spillway will be conducted immediately following the mandatory pre-bid conference.

Direct questions related to the design of the project through the following:

https://www.civcastusa.com

All bidders are encouraged to direct all questions through the online system. Any and all questions addressed directly with the Project Manager will be consolidated and made available to all interested parties.

All questions can be submitted on this site until **Wednesday**, **April 26, 2023 at 5:00 PM (Central Time).**

This project consists of **electrical improvements to the spillway at Toledo Bend Dam.**

Bidders must submit a cashier's check, certified check, or acceptable bidder's bond with their proposal as a guarantee that the Bidder will enter into a contract for the project with the Owner within fifteen (15) days of Notice of Award of the contract. The security must be payable to Owner in the amount of five (5%) percent of the bid submitted. Contractor must execute the contract, bonds and certificates of insurance on the forms provided in the Contract Documents.

Contractors for this project must pay no less than the prevailing wage rates for the area established by the Owner and included in the Contract Documents.

Put Louisiana Contractor number on sealed bid package.

Performance and Payment Bonds are required.

The Owner reserves the right to adopt the most advantageous interpretation of the bids submitted in the case of ambiguity or lack of clearness in stating proposal prices, to reject any or all bids, and/or waive formalities. Bids may not be withdrawn within forty-five (45) days from date on which bids are opened, in accordance with R.S. 38:2215.

This project is located in the State of Louisiana. The rules and regulations of the State Licensing Board for Contractors will apply in accordance with Louisiana Statutes 27:2151-2163. Information relative to licensing may be obtained from the offices of said board in Baton Rouge. The estimated contract cost is more than $50,000; therefore, only Louisiana licensed contractors may receive bid documents as provided in above regulations.

Sabine River Authority of Texas
Sabine River Authority, State of Louisiana

00 21 13 INSTRUCTIONS TO BIDDERS

1.00 GENERAL

1.01 DEFINED TERMS

A. Terms used in these Instructions to Bidders have the meanings assigned to them in the General Conditions.

1.02 QUALIFICATIONS OF BIDDERS

A. Owner may conduct investigations as considered necessary to establish the responsibility, qualifications and financial ability of the Bidders, proposed subcontractors and other persons and organizations to do the Work in accordance with the Contract Documents, to Owner's satisfaction, and within the prescribed time. Owner may reject the Bid of any Bidder who does not meet any such evaluation to Owner's satisfaction.

B. The Bidder must be fully qualified under any state or local licensing law for Contractors in effect at the time and at the location of the Work before submitting his Bid. Louisiana R.S. 37:2150, et seq. will be considered, if applicable.

C. The Bidder shall be responsible for determining that all of his sub-bidders or prospective subcontractors are duly licensed in accordance with law.

D. In accordance with La. R.S. 38:2227 and R.S. 38:2212.10, each Bidder on this Project must submit Section 00 42 23.04 “Attestations” included in the Contract Documents. The form shall be submitted to Owner within 10 days after the opening of Bids.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

A. Examine Contract Documents, make observations and investigations, correlate knowledge and observations with the requirements of the Contract Documents and consider these in preparation of a Bid for the Project.

1. Read the Contract Documents and related technical data and reports thoroughly. Use a complete set of Contract Documents in preparing Bids. Assume responsibility for errors or misinterpretations resulting from the use of partial or incomplete Contract Documents.

2. Visit the Site to become familiar with general, local and Site conditions that may affect cost, progress or performance of the Work in any manner.

3. Become familiar with federal, state and local laws, ordinances, rules and regulations affecting cost, progress or performance of the Work.

B. Surveys and investigation reports of subsurface or latent physical conditions at the Site, or conditions or situations affecting the design of the Project used by the Engineer in preparing the Contract Documents are referenced in the Supplementary Conditions.

1. These reports are available for information only and neither the Owner nor Engineer guarantees their accuracy or that any opinions expressed in the report are correct.

2. Make additional surveys and investigations as necessary to determine the Bid Price for performance of the Work in compliance with the terms of the Contract Documents before submitting a Bid.

3. Cost for these investigations is to be paid by the Bidders.

C. Acknowledge sole responsibility for Site safety, including trench excavation and confined space entry safety, by the submission of a Bid for this Project.

D. Attend the pre-bid conference. Bids will not be accepted from Bidders who do not attend the conference.

E. The submission of a Bid is incontrovertible representation by the Bidder that he has complied with every requirement of this Section.

1.04 INTERPRETATIONS

A. Submit all questions about the meaning or intent of the Contract Documents to the Engineer in writing. Replies are issued by Addenda to all parties recorded by Engineer as having received the Contract Documents. Only questions answered by formal written Addenda are binding. Oral and other interpretations or clarifications will be without legal effect. Questions received less than 4 working days prior to the date for opening of Bids may not be answered.

B. Except as described herein, Addenda shall not be issued within a period of 72 hours prior to the advertised time for the opening of Bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying the Contract Documents within the 72-hour period prior to the advertised time for the opening of Bids, then the opening of Bids shall be extended at least 7 but no more than 21 working days, without the requirement of re-advertising. The revised time and date for the opening of Bids shall be stated in the addendum.

1.05 BID SECURITY

A. Submit a bid security in the amount of 5 percent of the amount of the maximum total bid as a guarantee that the Bidder will promptly enter into a contract and execute performance and payment bonds on the forms included in the Contract Documents if awarded the Contract.

B. Acceptable bid securities are:

1. Certified or cashier's check made payable to the Owner.

2. An approved bid bond.

a. Bond must be written by a surety company licensed to do business in Louisiana, signed by the surety’s agency or attorney-in-fact.

b. Surety must be listed on the current U.S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater than the amount for which it obligates itself in the bond, or must be a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A.M. Best‘s Key Rating Guide. If surety qualifies by virtue of its

Best's listing, the amount of the Bond may not exceed 10 percent of the policyholders' surplus as shown in the latest A.M. Best's Key Rating Guide.

C. Bid securities will be returned to Bidders when the contract award is made or Bids are rejected.

1.06 CONTRACT TIME

A. Provisions for Contract Times are set forth in the Agreement.

1.07 BID FORM

A. Submit Bids on the Bid Forms provided with the Contract Documents for each Bid. Include supplemental data to be furnished in the same sealed envelope with Bid.

B. Bid forms must be completed in ink. The Bid Price of each item on the form must be stated in figures/numerals only.

C. The Bid shall include the legal name of Bidder and shall be signed by the person or persons legally authorized to bind the Bidder to a contract.

1. The authority of the signature of the person submitting the Bid shall be deemed sufficient and acceptable under any of the following conditions:

a. Signature on Bid is that of any corporate officer or member of a partnership or partnership in commendam listed on most current annual report on file with Secretary of State.

b. Signature on Bid is that of authorized representative of corporation, partnership, or other legal entity and Bid is accompanied by corporate resolution, certification as to the corporate principal, or other documents indicating authority.

c. Corporation, partnership, or other legal entity has filed in the records of the Secretary of State, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. A Bid submitted by an agency shall have a current Power of Attorney attached certifying agent's authority to bind Bidder. The name and license number on the envelope shall be the same as the entity identified on the Bid Form.

D. Acknowledge receipt of all Addenda on the Bid Form by signing beside the Addenda number.

1.08 SUBMISSION OF BIDS

A. Submit Bids at the time and place indicated in the Invitation for Bids. Each bid shall be submitted in a sealed envelope showing the name, address, and Louisiana Contractor's license number of the Bidder and the name of the Project for which the Bid is submitted. Any bid received which does not display the bidder's Louisiana Contractor's license number on the bid envelope shall be automatically rejected. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed as specified in the Bid Form. Include the bid security and other required documents in the envelope.

1.09 MODIFICATION AND WITHDRAWAL OF BIDS

A. Modify or withdraw Bids by submitting an appropriate document executed in the manner that a Bid must be executed. Deliver the modification or withdrawal to the place where Bids are to be submitted at any time prior to the opening of Bids.

1. Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of Work, labor, material, or services made directly in the compilation of the Bid, may be withdrawn by the Bidder if clear and convincing sworn, written evidence of such errors is furnished to the public entity within 48 hours of the bid opening excluding Saturdays, Sundays, and legal holidays. Such errors must be clearly shown by objective evidence drawn from inspection of the original work papers, documents, or materials used in the preparation of the Bid sought to be withdrawn. If the public entity determines that the error is a patently obvious mechanical, clerical, or mathematical error, or unintentional omission of a substantial quantity of Work, labor, material, or services, as opposed to a judgment error, and that the Bid was submitted in good faith it shall accept the withdrawal and return the bid security to the Bidder.

2. A Bidder who attempts to withdraw a Bid shall not be allowed to resubmit a Bid on the Project.

1.10 OPENING OF BIDS

A. Bids will be opened as indicated in the Invitation for Bids.

B. All Bids shall remain open for the period of time set forth in the Invitation for Bids, but Owner may, in his sole discretion, release any Bid and return the Bid security prior to that date.

1.11 AWARD OF CONTRACT

A. The Owner shall have the right to reject any or all bids as allowed by La. R.S. 38:2214 and in particular to reject a bid not accompanied by the required bid security or data required by the Bidding Documents or a bid in any way incomplete or irregular.

B. The Contract will be awarded to the lowest responsible and responsive Bidder. Determination of the low Bidder shall be on the basis of the total base bid for all work required by the Bidding Documents, calculated as the sum of the unit price extensions (quantity times unit price) on the Unit Price Form.

C. In awarding the Contract, preference shall be given to Louisiana resident contractors over non-resident contractors, in accordance with La. R.S. 38:2211, et seq.

D. Each Bidder agrees to waive any claim it has or may have against the Owner, the Engineer, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any Bid.

1.12 EXECUTION OF CONTRACT

A. The Successful Bidder must execute the formal Contract Agreement and required bonds on the forms prepared and submitted by the Owner within 15 days after the Notice of Award.

B. In accordance with La. R.S. 38:2224, the Successful Bidder shall, at the time of the signing of the Contract, execute the Non-Collusion Affidavit included in the Contract Documents.

C. A Notice to Proceed authorizing the Contractor to commence Work will be issued within 30 days after the Contract Documents have been executed.

1.13 WAGE RATES

A. Contractor must pay no less than the general prevailing rates for the Project location as determined in accordance with statutory requirements.

1.14 BONDS

A. Performance and Payment Bonds are required for this Project and shall be provided in accordance with the General Conditions.

1.15 SALES TAXES

A. The Owner qualifies as an exempt agency as defined by the statutes of the State of Louisiana and the State of Texas. The Owner's purchasing department will issue exemption certificates. Comply with all statutes and rulings of the State of Louisiana and the State of Texas.

1.16 PREFERENCES

A. Preference is hereby given to materials, supplies, and provisions, produced, manufactured or grown in Louisiana, quality being equal to articles offered by competitors outside of the State.

1.17 SUBSTITUTES AND “OR-EQUALS”

A. The name of a certain brand, make, manufacturer, or definite specifications is to denote the quality standard of the article desired, but does not restrict Bidders to the specific brand, make, manufacturer, or specification named. It is to set forth and convey to prospective Bidders the general style, type, character, and quality of article desired.

B. When in The Contract Documents a particular brand, make of material, device, or equipment is shown or specified, such brand, make of material, device, or equipment shall be regarded merely as a standard.

1. If a Bidder wishes to submit for prior approval a particular product other than a product specified in the Contract Documents, he shall do so no later than 7 working days prior to the opening of bids. Within 3 days, exclusive of holidays and weekends, after such submission, the Engineer shall furnish to both the public entity and the Bidder written approval or denial of the product submitted.

1.18 BIDDER’S REPRESENTATIONS

A. In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

1. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all of which is hereby acknowledged.

2. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and the furnishing of Goods and Special Services.
4. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in SC-4.02, and (2) reports and drawings of Hazardous Environmental Conditions that have been identified in SC-4.06.
5. Bidder has obtained and carefully studied all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions including surface, subsurface and Underground Facilities at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto or accepts the consequences for not doing so.
6. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the prices bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
7. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
8. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
11. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.
12. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner. Bidder must submit Section 00 42 23.03 “Bid Affidavit” included in the Contract Documents. The form shall be submitted to Owner within 10 days after the opening of Bids.

1.19 BID PROPOSAL

A. Bids are to be submitted for the following Items:

Bid Item	Description
1	Cost of performance and payment bonds and cost of insurance
2	Mobilization and demobilization
3	Spillway Electrical Improvements
4	Canopy Lights
5	Remobilization to Install Owner Furnished Equipment
6	Storm Water Pollution Prevention Plan (SWPPP)

END OF SECTION

LOUISIANA UNIFORM PUBLIC WORK BID FORM

To: Sabine River Authority of Texas
Sabine River Authority, State of Louisiana
450 Spur 135, Burkeville, Texas 75932

Bid For: Toledo Bend Project Spillway Electrical Improvements

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by Freese and Nichols, Inc. and dated _____.

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:**

Addendum No.	Addendum Date	Signature Acknowledging Receipt

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by:_____ _____ and dated: _____

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(N/A)* for the lump sum of:

N/A Dollars ($ N/A)

Alternate No. 2 *(N/A))* for the lump sum of:

N/A Dollars ($ N/A)

Alternate No. 3 *(N/A)* for the lump sum of:

N/A Dollars ($ N/A)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

To: Sabine River Authority of Texas
Sabine River Authority, State of Louisiana
450 Spur 125, Burkeville, Texas 75932

Bid For: Toledo Bend Project Spilway Electrical Improvements

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Cost of Performance and Payment Bonds and Cost of Insurance			
REF. NO.1	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Mobilization and demobilization			
REF. NO.2	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Spillway Electrical Improvements			
REF. NO.3	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Canopy Lights			
REF. NO.4	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Remobilization to Install Owner Furnished Equipment			
REF. NO.5	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

DESCRIPTION:	■ Base Bid or ❑Alt.# ___ Storm Water Pollution Prevention Plan			
REF. NO.6	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

00 42 23.02 VENDOR COMPLIANCE TO STATE LAW

Louisiana R.S. 38:2225 applies to the award of public works contracts to nonresident bidders. This law provides that:

> "If a nonresident contractor bidding on public work in the state of Louisiana is domiciled in a state that provides a percentage preference in favor of contractors domiciled in that state over Louisiana resident contractors for the same type of work, then every Louisiana resident contractor shall be granted the same preference over contractors domiciled in the other state favoring contractors domiciled therein whenever the nonresident contractor bids on public work in Louisiana."
>
> "Any local law, either by legislative act or otherwise, ordinance, or executive order enacted prior to the effective date of this Act, or enacted hereinafter in conflict with this Section, or granting any local contractor or subcontractor preference over other Louisiana resident contractors shall be contrary to the provision of this Section."
>
> "The provisions and requirements of this Section shall not be waived by any public entity."

Check the statement that is correct for Bidder.

[___] Nonresident bidders in _____ (give state), our principal place of business, are required to be _____percent lower than resident bidders by State law. A copy of the statute is attached.

[___] Nonresident bidders in _____ (give state), our principal place of business, are not required to under bid resident bidders.

[___] Our principal place of business or corporate offices are in the State of Louisiana.

Bidder:

Company Name: _____
(typed or printed)

By: _____
(Signature -- attach evidence of authority to sign)

Name: _____
(typed or printed)

Title: _____
(Signature of Corporate Secretary)

Business Address: _____

_____

Phone: _____ Facsimile: _____ E-mail _____

END OF SECTION

00 42 23.03 BID AFFIDAVIT

STATE OF LOUISIANA

PARISH OF SABINE

BEFORE ME, the undersigned authority, personally came and appeared

_____, who after being by me duly sworn,

deposed and said that he is the fully Authorized _____ of _____

(herein after referred to as bidder) the party who submitted a bid for _____

which bid was received by insert name of Owner on _____ and said affiant further

said:

(1) That bidder employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the bidder whose services in connection with the construction of the public building or project or in securing the public contract were in the regular course of their duties for bidder; and

(2) That no part of the contract price received by bidder was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the bidder whose services in connection with the construction of the public building or project were in the regular course of their duties for bidder.

(3) Said bid is genuine and the bidder has not colluded, conspired or agreed directly or indirectly with any other bidder to offer a sham or collusive bid.

(4) Said bidder has not in any manner directly or indirectly agreed with any other person to fix the bid price of affiant or any other bidder, or to fix any overhead profit or cost element of said bid price, or that of any other bidder, or to induce any other person to refrain from bidding.

(5) All statements contained in said bid are true and correct.

(6) Neither affiant nor any member of this company has divulged information regarding said bid or any data relative thereto to any other person, firm or corporation.

_____

Affiant

SWORN TO AND SUBSCRIBED

BEFORE ME THIS_____

DAY OF _____, 20_____

_____

Notary Public

00 42 23.04 ATTESTATIONS

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)
(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:23)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record (R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks (R.S. 14:71)
(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 VERIFICATION OF EMPLOYEES

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

NAME OF BIDDER	**NAME OF AUTHORIZED SIGNATORY OF BIDDER**
DATE	**TITLE OF AUTHORIZED SIGNATORY OF BIDDER**
SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER	

00 45 16 STATEMENT OF QUALIFICATIONS

1.00 GENERAL

1.01 The Statement of Qualifications must be submitted by the apparent low Bidder within 10 calendar days of the Bid opening and include, as a minimum, the information as described in this Section. Failure to submit the required information in the Statement of Qualifications may result in the Owner considering the Bid non-responsive and result in rejection of the Bid by the Owner. Bidders may be required to provide supplemental information if requested by the Owner to clarify, enhance or supplement the information provided in the Statement of Qualifications.

1.02 Bidders must provide the information requested in the Qualifications Statement using the forms attached to this Section. A copy of these forms may be provided in Microsoft Word to assist with the preparation of the Statement of Qualifications. Information in these forms must be provided completely and in detail. Information that cannot be totally incorporated in the form may be included in an appendix to the form. This appendix must be clearly referenced by appendix number in the form, and the appended material must include the appendix number on every sheet of the appendix. The appendix must include only the information that responds to the question or item number to which the appended information applies.

1.03 Bidders may provide supplemental information to the Statement of Qualifications using AIA, AGC or other industry standard statement of qualification forms and / or Bidders may submit additional information such as organizational brochures or other marketing information. This information may not be submitted as a substitute to the information specifically requested in this Section, or in the Statement of Qualifications forms. If this information is included as an appendix to the information requested in this Section, the reference must include the specific paragraph or section that applies to that question or item.

Contractor's General Information

Organization doing business as						
Business address of principle office						
Telephone numbers						
Main number						
Fax number						
Website address						
Form of business (check one)		A corporation		A partnership		An individual
If a corporation						
Date of incorporation						
State of incorporation						
Chief Executive Manager's name						
President's name						
Vice President's name(s)						
Secretary's name						
Treasurer's name						
If a Partnership						
Date of organization						
State whether partnership is general or limited						
If an Individual						
Name						
Business address						
Identify all individuals not previously named which exert a significant amount of business control over the organization						
Indicators of organization size						
Average number of current full time employees		Average estimate of revenue for the current year				

Contractor's Organizational Experience

Organization doing business as	
Business address of regional office	
Name of regional office manager	
Telephone numbers	
Main number	
Fax number	
Website address	

Organization History

List of names that this organization currently, has or anticipates operating under over the history of the organization, including the names of related companies presently doing business:

Names of organization	From date	To date

List of companies, firms or organizations that own any part of the organization.

Name of companies, firms or organization.	Percent ownership

Construction Experience

Years experience in projects similar to the proposed project:

As a general contractor		As a joint venture partner	

Has this or a predecessor organization ever defaulted on a project or failed to complete any work awarded to it?	
If yes provide full details in a separate attachment. See attachment No.	
Has this or a predecessor organization been released from a bid or proposal in the past ten years?	
If yes provide full details in a separate attachment. See attachment No.	
Has this or a predecessor organization ever been disqualification as a bidder or proposer by any local, state, or federal agency within the last 5 years?	
If yes provide full details in a separate attachment. See attachment No.	
Is this organization or your proposed surety currently in any litigation or contemplating litigation?	
If yes provide full details in a separate attachment. See attachment No.	
Has this or a predecessor organization ever refused to construct or refused to provide materials defined in the contract documents?	
If yes provide full details in a separate attachment. See attachment No.	

Contractor's Proposed Key Personnel

Organization doing business as:	

Proposed project organization

Provide a brief description of the managerial structure of the organization and illustrate with an organizational cart. Include the title and names of key personnel. Include this chart at an attachment to this description. See attachment No.

Provide a brief description of the managerial structure proposed for this project and illustrate with an organizational cart. Include the title and names of proposed key personnel and alternates. Include this chart at an attachment to this description. See attachment No.

Experience of Key Personnel

Provide information on the key personnel proposed for this project that will provide the following key functions. Provide information for candidates for each of these positions on the pages for each of these key personnel. Also provide biographical information for each primary and alternate candidate as an attachment. The biographical information must include the following as a minimum: technical experience, managerial experience, education and formal training, work history which describes project experience, including the roles and responsibilities for each assignment, and primary language. Additional information highlighting experience which makes them the best candidate for the assignment should also be included.

Role	Primary candidate	Alternate candidate
Project manager		
Project superintendent		
Project safety manager		
Quality control manager		

If key personnel are to fulfill more than one of the roles listed above, provide a written narrative describing how much time will be devoted to each function, their qualifications to fulfill each role and the percentage of their time that will be devoted to each role. If the individual is not to be devoted solely to this project, indicate how time it to be divided between this project and their other assignments.

Proposed Project Managers

Organization doing business as			
Primary candidate			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidates role on project	
Alternate candidate			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	

Proposed Project Superintendent

Organization doing business as			
Primary candidate			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as superintendent			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	
Alternate candidate			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as superintendent			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	

Proposed Project Safety Officer

Organization doing business as			
Primary candidate			
Name of individual			
Years of experience as project safety manager			
Years of experience with this organization			
Number of similar projects as safety manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	
Alternate candidate			
Name of individual			
Years of experience as project safety manager			
Years of experience with this organization			
Number of similar projects as safety manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	

Proposed Project Quality Control Manager

Organization doing business as			
Primary candidate			
Name of individual			
Years of experience as quality control manager			
Years of experience with this organization			
Number of similar projects as quality manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ position		Title/ position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on project		Candidate role on project	
Alternate candidate			
Name of individual			
Years of experience as quality control manager			
Years of experience with this organization			
Number of similar projects as quality manager			
Number of similar projects in other positions			
Current project assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)			
Name		Name	
Title/ Position		Title/ Position	
Organization		Organization	
Telephone		Telephone	
E-mail		E-mail	
Project		Project	
Candidate role on Project		Candidate role on Project	

Contractor's Project Experience and Resources

Organization doing business as:	

Projects

Provide a list of major projects that are currently underway, or have been completed within the last ten years on Attachment A.

Provide a completed Project Information form (Attachment B) for projects that have been completed in the last five years which specifically illustrate the organizations capability to provide best value to the Owner for this project.

Include a completed Project Information form (Attachment B) for projects which illustrate the experience of the proposed key personnel.

Provide a description of your organizations approach to completing this project to provide best value for the Owner. Including a description of your approach in the following areas:

1. Contract administration
2. Management of subcontractor and suppliers
3. Time management
4. Cost control
5. Quality management
6. Project site safety
7. Managing changes to the project
8. Managing equipment
9. Meeting HUB / MWBE Participation Goal

Equipment

Provide a list of major equipment proposed for use on this project. Attach additional information if necessary

Equipment item	Primary use on project	Own	Will buy	Lease

Division of work between organization and subcontractor

What work will the organization complete using its own resources?

What work does the organization propose to subcontract on this project?

Contractor's Subcontractors and Vendors

Organization doing business as:	

Project subcontractors

Provide a list of subcontractors that will provide more than 10 percent of the work (based on contract amounts

Name	Work to be provided	Est. percent of contract	HUB/MWBE firm

Provide information on the proposed key personnel, project experience and a description of past relationship and work experience for each subcontractor listed above using the Project Information forms.

Suppliers

Provide a list of major equipment or materials proposed for use on this project. Attach additional information if necessary.

Supplier name	Equipment / material provided	Furnish only	Furnish and install	HUB/MWBE firm

Current Projects and Project Completed within the last 10 Years

Project owner			Project name		
General description of project:					
Project cost			Date project completed		
Key project personnel	Project manager		Project superintendent	Safety manager	Quality control manager
Name					
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/ position	Organization	Telephone	E-mail
Owner					
Designer					
Construction manager					

Project owner			Project name		
General description of project:					
Project cost			Date project completed		
Key project personnel	Project manager		Project superintendent	Safety manager	Quality control manager
Name					
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/ position	Organization	Telephone	E-mail
Owner					
Designer					
Construction manager					

Project owner			Project name		
General description of project:					
Project cost			Date project completed		
Key project personnel	Project manager		Project superintendent	Safety manager	Quality control manager
Name					
Reference contact information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/ position	Organization	Telephone	E-mail
Owner					
Designer					
Construction manager					

Project Information

Project owner		Project name	
General description of project			

Project Budget and Schedule Performance					
Budget history			Schedule performance		
	Amount	% of Bid Amount		Date	Days
Bid			Notice to Proceed		
Change orders			Contract Substantial Completion date at Notice to Proceed		
Owner enhancements			Contract final completion date at Notice to Proceed		
Unforeseen conditions			Change Order authorized Substantial Completion date		
Design issues			Change Order authorized final completion date		
Total			Actual / estimated Substantial Completion date		
Final cost			Actual / estimated final completion date		

Key Project Personnel				
	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
Name				
Percentage of time devoted to the project.				
Proposed for this project.				
Did Individual start and complete the project?				
If not, who started or completed the project in their place.				
Reason for change.				

Reference contact information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/ position	Organization	Telephone	E-mail
Owner					
Designer					
Construction Manager					
Surety					

Issues / disputes resolved or pending resolution by arbitration, litigation or dispute review boards							
Number of issues resolved:		Total amount involved in resolved issues:		Number of issues pending:		Total amount involved in resolved Issues:	

Affidavits

One of the following four affidavits shall be executed and provided with this information. The individual signing the affidavit shall attach evidence of their authority to bind the organization to an agreement.

AFFIDAVIT FOR CORPORATION

State _____) §

County/Parish of _____) §

_____, being duly sworn deposes and says

(Name)

that they are _____ of the

(*Title*)

_____ corporation submitting the foregoing qualification form and related information; have read such documents; and that such documents are true and correct and contain no material misrepresentations; and that they are authorized to make this affidavit on behalf of the Corporation.

_____

(Signature)

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

_____

(Notary Public)

My commission expires:

AFFIDAVIT FOR PARTNERSHIP

State _____) §

County /Parish of _____) §

_____, being duly sworn deposes and says

(Name)

that they are _____ of the

(*Title*)

_____ company submitting the foregoing qualification form and related information; have read such documents; and that such documents are true and correct and contain no material misrepresentations; and that they are authorized to make this affidavit on behalf of the Partnership.

_____

(Signature)

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

_____

(Notary Public)

My commission expires:

AFFIDAVIT FOR INDIVIDUAL

State _____) §

County/Parish of _____) §

_____, being duly sworn deposes and says

(Name)

that they are _____ of the

(*Title*)

_____ company submitting the foregoing qualification form and related information; have read such documents; and that such documents are true and correct and contain no material misrepresentations.

_____

(Signature)

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

_____

(Notary Public)

My commission expires:

JOINT VENTURE STATEMENT

We the undersigned do hereby give notice to our agreement to bid as a joint venture on the Project.

_____

(Name of Joint Venture)

……

_____

(Name of Firm)

_____

(Signature)

Signed and sworn to me before this _____ day of _____, 20____

_____

(Notary Public)

My commission expires: _____

……

_____

(Name of Firm)

_____

(Signature)

Signed and sworn to me before this _____ day of _____, 20____

_____

(Notary Public)

My commission expires: _____

……

END OF SECTION

00 52 23 AGREEMENT

This Agreement is between Sabine River Authority of Texas and Sabine River Authority, State of Louisiana ("Owners"), and _____ _____("Contractor").

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1: WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

A. Electrical improvements to the Toledo Bend Dam Spillway which consist of new incoming electrical service, new gate control panels, installation of Owner furnished 60kW diesel generator with external fuel tank and Owner furnished automatic transfer switch, new lighting under gate canopies, new starter panel for relief wells 4 and 10, new level control panel for relief wells 4 and 10, and new electrical distribution equipment.

ARTICLE 2: THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Toledo Bend Project Spillway Electrical Improvements

ARTICLE 3: ENGINEER

3.01 The Project has been designed by:

Freese and Nichols, Inc.
801 Cherry Street, Suite 2800
Fort Worth, Texas, 76102

Engineer, who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4: CONTRACT TIMES

4.01 Time of the Essence: All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract. A formal notice to proceed will be issued no later than 90 days after the bid opening.

4.02 Dates for Substantial Completion and Final Payment:

A. The Work will be substantially completed in 295 days, and completed and ready for final payment in accordance with Paragraph 15.03 of the General Conditions within 45 days of substantial completion.

4.03 Liquidated Damages: Contractor and Owner recognize that time is of the essence and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 2.03, plus any extensions of Contract Time allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration preceding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner $500 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner $500 for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment. The Owner will be the sole judge as to whether the Work has been completed within the allotted time. Assessment of liquidated damages by the Owner shall not constitute a waiver of the Owner's right to sue and collect additional damages which Owner may sustain by the failure of the Contractor to perform in accordance with the terms of its Contract.

ARTICLE 5: CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents for the unit prices shown in the attached in Section 00 42 23.01 "Unit Price Form." Unit Prices have been computed in accordance with Paragraph 13.03.B of the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents and based on Total Contract Award $_____.

ARTICLE 6: PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments: Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions. **Payment will become due 30 days after Engineer's Recommendation or 45 days from payment application receipt.**

6.02 Progress Payments; Retainage:

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work. All such payments will be measured by the number of units of Work completed at the Unit Price.

B. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including, but not limited to liquidated damages, in accordance with the Contract and Texas Water Code Chapter 49.276.

a. **90** percent of the value of the Work completed (with the balance retainage)

b. **90** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage)

C. Payment will be less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 15.01 of the General Conditions. In addition to the amount retained above, the Owner may retain additional amounts as set forth elsewhere in the Contract Documents.

6.03 Final Payment: Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer.

ARTICLE 7: CONTRACTOR'S REPRESENTATIONS

7.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bid Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site including Underground Facilities which have been identified in Paragraph SC-5.03 of the Supplementary Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in Paragraph SC-5.06 of the Supplementary Conditions.

E. Contractor has obtained and carefully studied all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions including surface, subsurface, and Underground Facilities at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bid Documents, and safety precautions and programs incident thereto or assumes responsibility for doing so.

F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

K. Contractor shall perform its services under this Agreement and consistent therewith shall cause the entire Work as defined in this Agreement to be executed in accordance with the standard of care and skill for Contractors experienced and specializing in such services in a thorough and workmanlike manner. Contractor agrees to furnish the best professional skill and judgment necessary to perform the Work and fulfill its duties under the Contract Documents. Contractor agrees to furnish efficient business administration and superintendence, to furnish at all times an adequate supply of workers and materials necessary to perform the Work timely as required by the Contract Documents. Contractor represents to Owner that Contractor is experienced in performance of the Work required by the Contract Documents.

L. Contractor's prior experience shall include satisfactory completion of at least one project similar to the size and scope of this project, which project shall be specified in the Statement of Qualifications.

ARTICLE 8: CONTRACT DOCUMENTS

8.01 Contents

A. The Contract Documents consist of the following:

1. Specifications, forms and documents listed in Section 00 01 10 "Table of Contents" except as specifically excluded in Paragraph C.
2. Drawings as listed in the Sheet Index in the Drawings themselves.
3. Addenda (00 91 13).
4. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (00 42 23-1).
    b. Documentation submitted by Contractor prior to Notice of Award.

B. The following are also Contract Documents which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

1. Notice to Proceed.
2. Written Amendment(s).
3. Change Order(s).
4. Field Order(s).
5. Work Change Directive(s).
6. Engineers Written Interpretation(s).

C. These documents are attached to this Agreement as reference but are not part of the Contract Documents:

1. Documents specifically listed in Supplementary Condition SC-5.04 and SC-5.06.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 11.01 of the General Conditions.

ARTICLE 9: MISCELLANEOUS

9.01 Terms: Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

9.02 Assignment of Contract: No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.03 Successors and Assigns: Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9.04 Severability: Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

9.05 Contractor's Certifications: Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 9.05:

A. "Corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution.

B. "Fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

C. "Collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

D. "Coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

9.06 Venue: Venue shall lie exclusively in Sabine Parish, Louisiana for any legal action.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in five (5) sets. Three (3) sets have been delivered to Owner and two (2) sets have been delivered to Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____.

Owner: _____
(typed or printed)

By: _____
(Individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Owner: _____
(typed or printed)

By: _____
(Individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(Individual's signature)

Address for giving notice:

_____

_____

_____

Designated representative:

Name: _____

Title: _____

Address: _____

Contractor: _____
(typed or printed)

By: _____
(Individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(Individual's signature)

_____

_____

_____

Designated representative:

Name: _____

Title: _____

Address: _____

Phone:	Phone:
Facsimile:	Facsimile:
E-mail:	E-mail:

(*If Contractor is a corporation or a partnership, attach evidence of authority to sign*.)

END OF SECTION

00 61 13.13 PERFORMANCE BOND FORM

Contractor as Principal Name: Mailing address *(principal place of business)*:		**Surety** Name: Mailing address *(principal place of business)*:
Owner Name: Mailing address *(principal place of business)*:		Physical address *(principal place of business)*:
		Surety is a corporation organized and existing under the laws of the state of:_____ *By submitting this bond, Surety affirms their authority to do business in the State of Louisiana and their license to execute bonds in the State of Louisiana.*
Contract Project name and location: Effective Date of the Agreement: Contract Price:		Telephone *(main number)*: Telephone *(for notice of claim)*:
Bond Date of Bond *(Date of Bond cannot be earlier than Effective Date of Agreement)* Bond Amount:		Local Agent for Surety Name: Address: Telephone:

Surety and Contractor, intending to be legally bound and obligated to Owner do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative. The Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally to this bond. The condition of this obligation is such that if the Contractor as Principal faithfully performs the Work required by the Contract then this obligation shall be null and void; otherwise the obligation is to remain in full force and effect. Provisions of the bond shall be pursuant to the applicable terms and provisions of the laws of the State of Louisiana and all liabilities on this bond shall be determined in accordance with the provisions of said laws to the same extent as if it were copied at length herein. Venue shall lie exclusively in _____ Parish, Louisiana for any legal action.

Contractor as Principal	**Surety**
Signature: _____	Signature: _____
Name and Title: _____	Name and Title: _____
	(Attach Power of Attorney)

END OF SECTION

00 61 13.16 PAYMENT BOND FORM

Contractor as Principal Name: Mailing address *(principal place of business)*:		**Surety** Name: Mailing address *(principal place of business)*:
Owner Name: Mailing address *(principal place of business)*:		Physical address *(principal place of business)*:
		Surety is a corporation organized and existing under the laws of the state of:_____ *By submitting this bond, Surety affirms their authority to do business in the State of Louisiana and their license to execute bonds in the State of Louisiana.*
Contract Project name and location: Effective Date of the Agreement: Contract Price:		Telephone *(main number)*: Telephone *(for notice of claim)*:
Bond Date of Bond *(Date of Bond cannot be earlier than Effective Date of Agreement)* Bond Amount:		Local Agent for Surety Name: Address: Telephone:

Surety and Contractor, intending to be legally bound and obligated to Owner do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative. The Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally to this bond. The condition of this obligation is such that if the Contractor as Principal pays all claimants providing labor or materials to him or to a subcontractor in the prosecution of the Work required by the Contract then this obligation shall be null and void; otherwise the obligation is to remain in full force and effect. Provisions of the bond shall be pursuant to the applicable terms and provisions of the laws of the State of Louisiana and all liabilities on this bond shall be determined in accordance with the provisions of said laws to the same extent as if it were copied at length herein. Venue shall lie exclusively in _____ Parish, Louisiana for any legal action.

Contractor as Principal Signature: _____ Name and Title: _____	**Surety** Signature: _____ Name and Title: _____ *(Attach Power of Attorney)*

END OF SECTION

00 62 16 CERTIFICATE OF INSURANCE

The Certificate of Insurance shall be provided to the Owner by the Successful Bidder prior to conforming of documents. Certificate will be included in the documents to be executed by the Owner and in the conformed construction Contract Documents.

END OF SECTION

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;

2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

A. *Standards Specifications, Codes, Laws and Regulations*

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR THOSE FOR WHICH CONTRACTOR IS RESPONSIBLE.**

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in

Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, SUBCONTRACTORS, AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT, ARBITRATION, OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO A HAZARDOUS ENVIRONMENTAL CONDITION, PROVIDED THAT SUCH HAZARDOUS ENVIRONMENTAL CONDITION (1) WAS NOT SHOWN OR INDICATED IN THE DRAWINGS, SPECIFICATIONS, OR OTHER CONTRACT DOCUMENTS, IDENTIFIED AS TECHNICAL DATA ENTITLED TO LIMITED RELIANCE PURSUANT TO PARAGRAPH 5.06.B, OR IDENTIFIED IN THE CONTRACT DOCUMENTS TO BE INCLUDED WITHIN THE SCOPE OF THE WORK, AND (2) WAS NOT CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.I OBLIGATES OWNER TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE.**

J. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO THE FAILURE TO CONTROL, CONTAIN, OR REMOVE A CONSTITUENT OF CONCERN BROUGHT TO THE SITE BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE, OR TO A HAZARDOUS ENVIRONMENTAL CONDITION CREATED BY CONTRACTOR OR BY ANYONE FOR WHOM CONTRACTOR IS RESPONSIBLE. NOTHING IN THIS PARAGRAPH 5.06.J OBLIGATES CONTRACTOR TO INDEMNIFY ANY INDIVIDUAL OR ENTITY FROM AND AGAINST THE CONSEQUENCES OF THAT INDIVIDUAL'S OR ENTITY'S OWN NEGLIGENCE.**

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of

applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent

insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary

Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

B. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, OWNER SHALL INDEMNIFY AND HOLD HARMLESS CONTRACTOR, AND ITS OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE SPECIFIED IN THE CONTRACT DOCUMENTS, BUT NOT IDENTIFIED AS BEING SUBJECT TO PAYMENT OF ANY LICENSE FEE OR ROYALTY TO OTHERS REQUIRED BY PATENT RIGHTS OR COPYRIGHTS.**

C. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF**

PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE NOT SPECIFIED IN THE CONTRACT DOCUMENTS.

7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. **IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS, AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT IS NOT CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS DOES NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS UNDER PARAGRAPH 3.03.**

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted

or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Shop Drawing or Sample submittal;
6. The issuance of a notice of acceptability by Engineer;
7. The end of the correction period established in Paragraph 15.08;
8. Any inspection, test, or approval by others; or
9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM, FROM LOSSES, DAMAGES, COSTS, AND JUDGMENTS (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING FROM THIRD-PARTY CLAIMS OR ACTIONS RELATING TO OR RESULTING FROM THE PERFORMANCE OR FURNISHING OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, ACTION, LOSS, COST, JUDGMENT OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO DAMAGE TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE.**

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications,

certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the

Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) **INDEMNIFY AND HOLD HARMLESS OWNER AND ENGINEER, AND THE OFFICERS, DIRECTORS, MEMBERS, PARTNERS, EMPLOYEES, AGENTS, CONSULTANTS AND SUBCONTRACTORS OF EACH AND ANY OF THEM FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE**.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
   1. A mutually acceptable fixed fee; or
   2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
      a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
      b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
      c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
      d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
      e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
      f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents;

b. consent of the surety, if any, to final payment;

c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their

reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if

repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

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

00 73 00 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement Section 00 72 00 “General Conditions.” The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below.

The paragraph numbers used in the Supplementary Conditions correspond to the General Condition paragraphs they modify with the prefix "SC" added—for example, “Paragraph SC-4.05.” modifies General Conditions Paragraph 4.05.

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01 Defined Terms

A. Supplement Paragraph 1.01.A by inserting the following defined terms as numbered items in their proper alphabetical positions:

1. *Bid Security*—The financial security provided by Offeror at the time the Bid is submitted and held by Owner until the Agreement is executed and the evidence of insurance and bonds required by the Contract Documents are provided.

2. *Construction Manager*—The individual or entity named as the Construction Manager in the Agreement and the consultants, subconsultants, individuals, or entities directly or indirectly employed or retained by them to provide construction management as advisor services to the Owner.

3. *Contract Amendment*—A document issued on or after the Effective Date of the Contract and signed by Owner and Contractor which:

    a. Authorizes new phases of the Work and establishes the Contract Price, Contract Times, or terms and conditions of the Contract for the new phase of Work; or

    b. Modifies the terms and conditions of the Contract, but does not make changes in the Work.

4. *Contractor’s Team*—Contractor, Subcontractors, Suppliers, and individuals or entities directly or indirectly employed or retained by Contractor, Subcontractors, or Suppliers to perform part of the Work, or anyone for whose acts they may be liable.

5. *Defective*—When applied to Work, refers to Work that is unsatisfactory, faulty, or deficient in that it:

    a. Does not conform to the Contract Documents;

    b. Does not meet the requirements of applicable inspections, reference standards, tests, or approvals referred to in the Contract Documents; or

    c. Has been damaged prior to Construction Manager’s recommendation of final payment unless responsibility for the protection of the Work has been assumed by Owner at Substantial Completion in accordance with Paragraphs 15.03 or 15.04.

6. *Design Professional*—The individuals or entity named as the Architect or Engineer in the Agreement and the subconsultants, individuals, or entities directly or indirectly employed or retained by Design Professional to provide design or other technical services to the Owner. Design Professional has responsibility for design and technical issues related to the Contract Documents.

7. *Final Completion*—The point where the Work is complete in accordance with the Contract Documents, items and documents required by the Contract Documents have been accepted by the Owner and the Project is ready for Final Payment.

8. *Indemnified Costs*—All costs, losses, judgments, and damages resulting from claims or demands against Owner's Indemnitees. These costs include fees for design professionals, attorneys, and other professionals and any legal, court, arbitration, or other dispute resolution costs.

9. *Manufacturer*—The individual or entity that designs, casts, fabricates, manufactures, assembles, tests, and provides materials or equipment to be incorporated in the Work.

10. *Modification*—Change made to the Contract Documents by Contract Amendment, Change Order, Field Order, or Work Change Directive.

11. *Offeror*—An individual or entity that submits a Bid or Proposal to Owner. When used in the Bidding Documents, Proposal Documents, or Contract Documents, the term Bidder has the same meaning as the term Offeror.

12. *Owner's Budget*—The amount budgeted by the Owner for the construction of the Project.

13. *Owner's Indemnitees*—Each member of the OPT and their officers, directors, members, partners, employees, agents, consultants, and subcontractors.

14. *Owner's Project Team (OPT)*—The Owner, Design Professional, Construction Manager, and the other entities identified in the Supplementary Conditions and the consultants, subconsultants, individuals or entities directly or indirectly employed or retained by them to provide services to the Owner. The OPT consists of the following organizations:

    a. Sabine River Authority of Texas, Sabine River Authority, State of Louisiana, 450 Spur 135, Burkeville Texas 75932

    b. Freese and Nichols, Inc., 801 Cherry Street, Suite 2800, Fort Worth, Texas 76102.

15. *Project Construction Manager (PCM)*—The authorized representative of the OPT assigned to assist the Construction Manager at the Site. The term Project Construction Manager includes assistants and field staff of the Construction Manager.

16. *Project Management Information System (PMIS)*—The online project management system that will be used by OPT and Contractor to submit and share documentation and other related communications and information for this Project.

17. *Proposal Documents*—The Proposal Requirements, the proposed Contract Documents, and Addenda. When used in the Proposal Requirements or Contract

Documents, the term Bidding Documents has the same meaning as the term Proposal Documents.

18. *Proposal Requirements*—The Invitation to Bid or Request for Proposals, Instructions to Offerors, Bid Security or Proposal Security, Bid Form or Proposal Form and attachments, and required certifications and affidavits. When used in the Proposal Requirements or Contract Documents, the term Bidding Requirements has the same meaning as the term Proposal Requirements.

19. *Proposal Security*—The financial security provided by Offeror at the time the Proposal is submitted and held by Owner until the Agreement is executed and the evidence of insurance and bonds required by the Contract Documents are provided. When used in the Proposal Requirements or Contract Documents, the term Bid Security has the same meaning as the term Proposal Security.

20. *Schedule of Anticipated Payments*—A detailed tabulation, prepared and maintained by Contractor, showing the anticipated amount of each Application for Payment and the month in which they will be submitted.

21. Schedule of Documents—A detailed tabulation, prepared and maintained by Contractor, of each required document submittal and the time requirements for review and approval of each submittal. When used in the Bidding Requirements, Proposal Requirements, or Contract Documents, the term Schedule of Submittals has the same meaning as the term Schedule of Documents.

22. *Set-off*–A reduction in payment due to Contractor under Article 15.

B. Add the following:

51. Working Day- Any day in which weather or other conditions, not under the control of the CONTRACTOR, will permit construction of the principal units of work for a period of not less than 7 hours between 7:00 am an 6:00 pm. Saturdays, Sundays, and legal holidays will not be counted as a work day if not worked. If the CONTRACTOR works any of these days, he will be charged a working day. Work will not be permitted on Saturdays, Sundays, or legal holidays without the prior written approval of the OWNER.

52. Calendar Day – Every day of the month including Saturday, Sunday, legal holidays, rain days, or other adverse weather days.

SC-1.02 Terminology

A. Supplement Paragraph 1.02 by adding the following paragraphs:

"H. The terms "includes" and "including" are used as terms of enlargement and not of limitation or exclusive enumeration, and use of these terms does not create a presumption that components not expressed are excluded. The terms "consist of" or "consisting of" limits the interpretation to only those items specifically listed."

"I. It is understood that the cost of providing Work is included in the Contract Price and no additional compensation is to be paid by Owner unless specifically stated otherwise in the Contract Documents. Expressions like "at no additional cost to Owner," "at Contractor's expense," or similar words mean that the Contractor is to

include the cost of this Work in their Contract Price and perform or provide specified Work without an increase in the Contract Price."

"J. Written documents are required where reference is made to notices, reports, approvals, consents, statements, instructions, opinions, or other types of documentation or communications required by the Contract Documents. Approval and consent documents must be received by Contractor prior to the action or decision for which approval or consent is given. These may be made in printed or electronic format through the OPT's Project Management Information System or other electronic media as required by the Contract Documents or approved by the Construction Manager."

"K. Giving notice as required by the Contract Documents may be by printed or electronic media using a method that requires acknowledgment of the receipt of that notice."

ARTICLE 2—PRELIMINARY MATTERS

SC-2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance

A. Add the following:

D. Texas Ethics Commission – Contractor and Owner shall complete all documentation required to conform with HB 1295 including but not limited to Form 1295 "Certificate of Interested Parties".

E. Prohibition on Boycotting Israel – In accordance with Section 2270.002 of the Texas Government Code, Contractor hereby represents and warrants that Contractor: 1) Does not boycott Israel; and 2) will not boycott Israel during the term of this contract.

F. Prohibition on Boycotting Power Companies – In accordance with Section 2274.001 of the Texas Government Code, Contractor hereby represents and warrants that Contractor: 1) Does not boycott power companies and 2) will not boycott power companies during the term of this contract.

G. Prohibition on Companies that discriminate against firearm and ammunition industries - In accordance with Section 2274.002 of the Texas Government Code, Contractor hereby represents and warrants that Contractor: 1) Does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association; and 2) Will not discriminate during the term of the contract against a firearm entity or firearm trade association.

H. Posting of certain information at Commercial Building Construction Site Required – In accordance with Section 116.001 of the Texas Government Code, Contractor hereby represents and warrants that Contractor: 1) As soon as practicable after beginning construction of a commercial building project located in this state, the developer of the project shall visibly post the following information at the entrance to the construction site: a) the name and contact information of the developer; and b) a brief description of the project.

B. Delete Paragraph 2.01.B in its entirety and insert the following in its place:

"B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver copies of the

insurance policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in this Contract. Contractor may redact any confidential premium or pricing information contained in any policy or endorsement furnished under this provision."

C. Delete Paragraph 2.01.C in its entirety.

SC-2.02 Copies of Documents

A. Delete Paragraph 2.02.A in its entirety and insert the following in its place:

"A. Owner shall furnish to Contractor three (3) printed copies of the Contract Documents (including one fully signed counterpart of the Agreement). Electronic portable document format (PDF) shall be available upon request.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Intent

A. Delete Paragraph 3.01.A in its entirety and insert the following in its place:

"A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all. The Drawings and Specifications do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials, or equipment required for a complete and functional system even if they are not detailed or specified.

1. The Contract requirements described in the General Conditions, Supplementary Conditions, and General Requirements apply to each and all Sections of the Specifications unless specifically noted otherwise.

2. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing Work among Subcontractors, or to establish the extent of Work to be performed by any trade, Subcontractor, or Supplier. Specifications or details do not need to be indicated or specified in each specification or drawing. Items shown in the Contract Documents are applicable regardless of location in the Contract Documents.

3. Standard paragraph titles and other identifications of subject matter in the Specifications are intended to aid in locating and recognizing various requirements of the Specifications. Titles do not define, limit, or otherwise restrict specification text."

B. Supplement Paragraph 3.01.D by adding the following sentence:

"The Contract Documents comprise the entire Agreement between Owner and Contractor and may be modified only by Field Order, Change Order, Contract Amendment, or Work Change Directive."

C. Supplement Paragraphs 3.01 by adding the following paragraphs:

"H. Where compliance with two or more standards is specified and they establish different or conflicting requirements for minimum quantities or quality levels, Contractor shall comply with the most stringent requirements unless the Contract Documents indicate otherwise.

1. Quantity or quality level shown or indicated shall be the minimum to be provided or performed in every instance.

2. Actual installation shall comply exactly with minimum quality indicated or may exceed that minimum within reasonable limits.

3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.

4. Refer instances of uncertainty to the Engineer for a decision before proceeding."

"I. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the Project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the Drawings but are not included in the Specifications."

SC-3.02 Reference Standards

A. Supplement Paragraph 3.02.A by adding the following subparagraph:

"3. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract Documents where Contract Documents include more stringent requirements than the referenced standards.

a. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.

b. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the Work except as otherwise limited by the Contract Documents. Engineer will determine whether codes or standards are applicable to the performance of the Work.

c. Make copies of reference standards available as requested by Engineer or Owner."

SC-3.03 Reporting and Resolving Discrepancies

A. Delete Paragraph 3.03.A.3 in its entirety and insert the following in its place:

"3. In the event of a conflict in the Drawings, Specifications, or other portions of the Contract Documents which were not reported prior to the bidding of the Contract, the Contractor shall be deemed to have included the most expensive item, system, procedure, etc. in its Bid or Proposal."

SC-3.05 Reuse of Documents

A. Delete the last sentence of Paragraph 3.05.B and insert the following in its place:

"Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes, unless specifically prohibited in writing by the Owner for security reasons. If the Owner so directs, Contractor shall surrender all copies of the construction Contract Documents and other related documents, in paper or digital format and remove these documents from computer equipment or storage devices as a condition of final payment."

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.04 Progress Schedule

A. Supplement Paragraph 4.04 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents."

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.01 Availability of Lands

A. Supplement Paragraph 5.01.C by adding the following sentence:

"A copy of the written agreements for the use of such land shall be provided to the Owner for record purposes."

SC-5.02 Use of Site and Other Areas

A. Delete Paragraph 5.02.A.2 in its entirety and insert the following in its place:

"2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIM, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY CLAIM OR ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OWNER OR OCCUPANT AGAINST OWNER, ENGINEER, OR ANY OTHER PARTY INDEMNIFIED HEREUNDER TO THE EXTENT CAUSED DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART BY, OR BASED UPON, CONTRACTOR'S PERFORMANCE OF THE WORK, OR BECAUSE OF OTHER ACTIONS OR CONDUCT OF THE CONTRACTOR OR**

SC-5.03 Subsurface and Physical Conditions

A. Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

"A. No reports of explorations or tests of subsurface conditions at or contiguous to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner."

B. Add the following new paragraph immediately after Paragraph 5.03.D

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely: **[If there are no such reports, so indicate in the table.]**

Report Title	Date of Report	Technical Data
No Reports		

F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely: **[If there are no such drawings, so indicate in the table.]**

Drawings Title	Date of Drawings	Technical Data
No Drawings		

G. Contractor may examine copies of reports and drawings identified in SC 5.03.E and SC 5.03.F that were not included with the Bidding Documents at [location] during regular business hours, or may request copies from Engineer.

SC-5.04 Differing Subsurface or Physical Conditions

A. Amend Paragraph 5.04.A by deleting the word "promptly" and inserting "promptly, but no later than within 3 days," in its place.

SC-5.05 Underground Facilities

A. Amend Paragraph 5.05.B by deleting the word "promptly" and inserting "promptly, but no later than within 3 days," in its place.

SC-5.06 Hazardous Environmental Conditions at Site

A. Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

"A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner."

B. Delete Paragraph 5.06.I in its entirety

C. Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely: **[If there are no such reports, so indicate in the table]**

Report Title	Date of Report	Technical Data
No Reports		

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely: **[If there are no such drawings, so indicate in the table]**

Drawings Title	Date of Drawings	Technical Data
No Drawings		

ARTICLE 6—BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

A. Add the following paragraphs immediately after Paragraph 6.01.A:

1. Required Performance Bond Form: The performance bond that Contractor furnishes will be in the form of EJCDC® C 610, Performance Bond (2010, 2013, or 2018 edition). Performance Bond: By State statute, local governments must require a performance bond from all contractors where such contracts involve construction, alteration, or repair of buildings or other public works projects in excess of $100,000.00. Such bonds must be executed by a corporate surety authorized to do business in the State of Texas in accordance with Article 7.19-1 Bond of Surety Company; Chapter 7 of the Insurance Code, must be for not less than one-hundred percent (100%) of the contract price, and remain in effect for one year beyond the date of acceptance by the Owner. Performance bonds are conditioned upon “the faithful performance of the work in accordance with the drawings, specifications, and contract documents". These are in effect performance guarantees to assure completion of construction. These bonds are solely for the protection of the Owner. (Texas Government Code 2253.021)

2. Required Payment Bond Form: The payment bond that Contractor furnishes will be in the form of EJCDC® C 615, Payment Bond (2010, 2013, or 2018 edition). Payment Bond: A payment bond is one executed in connection with a contract (construction, alteration, or repair) to assure payment as required by law to all persons supplying labor and materials in the execution of work provided for in the contract. These bonds are required solely for the protection of all such claimants. These, like performance bonds, must be issued by a State approved corporate surety in accordance with Article 7.19-1 Bond of Surety Company; Chapter 7 of the Insurance Code, must also be for not less than one

hundred percent (100%) of the contract price, and remain in effect for one year beyond the date of acceptance by the Owner. The $25,000.00 State requirement (i.e., all contracts over that amount will require the Owner to have one hundred percent (100%) payment bonds) is also the same. (Texas Government Code 2253.021)

B. Supplement Paragraph 6.01 by adding the following paragraphs:

"I. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond or payment bond. By Contractor furnishing and Owner accepting these bonds, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor under these bonds, subject to Owner's priority to use the funds for the completion of the Work."

"J. Contractor or surety on behalf of Contractor shall promptly notify the Owner of all claims filed against the payment bond. When a claimant has satisfied the conditions prescribed by Laws and Regulations, the Contractor, or surety on behalf of Contractor, shall, with reasonable promptness, notify the claimant and Owner of the amounts that are undisputed and the basis for challenging any amounts that are disputed, including, but not limited to, the lack of substantiating documentation to support the claim as to entitlement or amount, and the Contractor, or surety on behalf of Contractor shall, with reasonable promptness, pay or make arrangements for payment of any undisputed amount; provided, however, that the failure of the Contractor or surety on behalf of Contractor to timely discharge its obligations under this paragraph or to dispute or identify any specific defense to all or any part of a claim shall not be deemed to be an admission of liability by the Contractor or surety as to such claim or otherwise constitute a waiver of the Contractor's or surety's defenses to, or right to dispute, such claim.

"K. Owner shall not be liable for payment of any costs or expenses of any claimant under payment bonds, and shall have no obligations to make payments to, give notices on behalf of, or otherwise have obligations to claimants under payment bonds."

SC-6.02 Insurance—General Provisions

A. Delete Paragraph 6.02.A in its entirety and insert the following in its place:

"A. Obtain and maintain insurance in accordance with Section 00 73 16 "Insurance Requirements.""

SC-6.03 Contractor's Insurance

A. Add the following language to 6.03.A.

a) The Contractor shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner.

b) Worker's Compensation Insurance: The Contractor shall procure and shall maintain during the life of this Contract Worker's Compensation Insurance, including employer liability insurance and coverages for occupational illness or disease with an available limit of at least $1,000,000 per occurrence for all of its employees to be engaged in work at the site of the project under this Contract and, in case of any such work sublet,

the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for all of the employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Worker's Compensation Insurance.

c) Commercial General Liability Insurance: including products/completed operation and broad form property damage limits with an available limit of at least $1,000,000 per occurrence with a $2,000,000 aggregate. The policy shall not exclude coverage for explosion, collapse or underground hazards, and pollution, or shall be endorsed for explosion, collapse or underground hazards, and pollution.

d) Automobile Liability Insurance: including use of all owned, non-owned and hired vehicles with an available limit of not less than: Bodily Injury $1,000,000 each person, $1,000,000 each occurrence: Property Damage $1,000,000 each occurrence, combined limit $2,000,000.

e) Longshoremen's and Harborworkers' Compensation Act insurance: to the extent required under such Act with regard to the work to be performed under the Contract.

f) Excess liability insurance or Umbrella insurance: over all of the foregoing primary policies with an available limit of at least $5,000,000.00 which follows form on Contractor's other policies.

g) Owner and Engineer shall be listed as additional insured on all insurance, except for Worker's Compensation and Employer's Liability insurance. Contractor shall provide a waiver of subrogation in favor of the Sabine River Authority on all policies.

h) Proof of Insurance: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and date of expiration of policies. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by the Owner."

SC-6.05 Property Losses; Subrogation

A. Delete the words "Owner and Contractor waive" in the first sentence of Paragraph 6.05.A.1 and replace it with the words "Contractor waives".

B. Delete Paragraph 6.05.B.1 in its entirety.

SC-6.06 Receipt and Application of Property Insurance Proceeds

A. Delete Paragraph 6.06 in its entirety.

SC-6.07 Owner's Insurance for Project

A. Add a new Paragraph 6.08 as follows:

"6.07 *Owner's Insurance for Project*

A. Owner shall not be responsible for purchasing and maintaining any insurance to protect the interest of the Contractor, Subcontractors, or others in the Work. The stated limits of insurance required are minimum only. Contractor shall determine the limits that are adequate. These limits may be basic policy limits or any combination

of basic limits and umbrella limits. In any event, Contractor is fully responsible for all losses arising out of, resulting from or connected with operations under this Contract whether or not said losses are covered by insurance. The acceptance of certificates or other evidence of insurance by the Owner, Engineer, and/or others listed as an additional insured, that in any respect do not comply with the Contract requirements does not release the Contractor from compliance herewith."

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

SC-7.03 Labor; Working Hours

A. Delete Paragraph 7.03.C in its entirety and insert the following in its place:

"C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, no Work shall be performed at the Site between 5:30 p.m. and 6:30 a.m. Contractor will not permit the performance of Work on a Saturday, Sunday, or any Owner holiday without Owner's written consent. Should Contractor desire to work on these days, Contractor shall contact the Owner, in writing, for approval at least 48 hours in advance. Emergency work may be done without prior permission. Tie ins and connections to existing facilities will be made at time authorized by the Owner. Owner's legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving, Christmas Eve and Christmas Day.

B. Supplement Paragraph 7.03 by adding the following paragraph:

"D. Contractor shall be responsible for the cost of overtime pay or other expense incurred by the Owner for Construction Management Services, Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under Article 15. For purposes of administering the foregoing requirement, additional overtime costs will be billed at rates shown in SC-15.01.E."

SC-7.08 Patent Fees and Royalties

A. Delete Paragraph 7.08.B in its entirety.

B. Delete Paragraph 7.08.C in its entirety and insert the following in its place:

"C. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY

INVENTION, DESIGN, PROCESS, PRODUCT, OR DEVICE NOT SPECIFIED IN THE CONTRACT DOCUMENTS.

SC-7.10 Taxes

A. Add a new paragraph immediately after Paragraph 7.10.A:

A. Owner is exempt by law from **State of Texas** sales and Use Tax Laws, and Federal Excise Tax on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-7.11 Laws and Regulations

A. Delete Paragraph 7.11.B in its entirety and insert the following in its place:

"B. IF CONTRACTOR PERFORMS ANY WORK OR TAKES ANY OTHER ACTION KNOWING OR HAVING REASON TO KNOW THAT IT IS CONTRARY TO LAWS OR REGULATIONS, CONTRACTOR SHALL BEAR ALL RESULTING COSTS AND LOSSES, AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS, COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH WORK OR OTHER ACTION. IT IS NOT CONTRACTOR'S RESPONSIBILITY TO MAKE CERTAIN THAT THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS IS IN ACCORDANCE WITH LAWS AND REGULATIONS, BUT THIS DOES NOT RELIEVE CONTRACTOR OF ITS OBLIGATIONS UNDER PARAGRAPH 3.03."

SC-7.15 Emergencies

A. Amend Paragraph 7.15.A by deleting the last sentence and inserting the following in its place:

"Contractor may submit a Change Proposal if the incident giving rise to the emergency action was not the responsibility of the Contractor and a change in the Contract Documents is required because of the emergency or the action taken by Contractor in response to such an emergency."

SC-7.16 Submittals

A. Delete Paragraph 7.16.A.3 in its entirety and insert the following in its place:

"3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents on a Shop Drawing Deviation Request form provided by the Engineer and request that a Field Order or Change Order be issued for each of the

specific variations submitted for approval. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation."

B. Delete Paragraph 7.16.C.4 in its entirety and insert the following in its place:

"4. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A and Engineer has given written approval of each such variation by issuing a Field Order or Change Order. If the proposed Modification is approved by the Engineer, the submittal will be considered to be in strict compliance with the Contract Documents and it will be reviewed in accordance with the Contract Documents. If the proposed Modification is not approved, the submittal will be returned to the Contractor with appropriate comments. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A."

C. Delete Paragraph 7.16.D.1 in its entirety and insert the following in its place:

"1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Resubmittals shall reference and respond directly to Engineer's previous comments. Any variations from strict compliance with the Contract Documents will be identified in the same manner as required in Paragraph 7.16.A and will require the same approvals."

SC-7.18 Indemnification

A. Delete Paragraph 7.18.A in its entirety and insert the following in its place:

"A. TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, AND IN ADDITION TO ANY OTHER OBLIGATIONS OF CONTRACTOR UNDER THE CONTRACT OR OTHERWISE, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM LOSSES, DAMAGES, COSTS, AND JUDGMENTS (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS, AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING FROM THIRD-PARTY CLAIMS OR ACTIONS RELATING TO OR RESULTING FROM THE PERFORMANCE OR FURNISHING OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, ACTION, LOSS, COST, JUDGMENT OR DAMAGE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH, OR TO DAMAGE TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), INCLUDING THE LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBCONTRACTOR, ANY SUPPLIER, OR ANY INDIVIDUAL OR ENTITY DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE."

B. Add a new paragraph:

C. NOTWITHSTANDING ANYTHING IN PARAGRAPH 7.18.A TO THE CONTRARY, IN THE EVENT A CLAIM ARISES FROM BODILY INJURY (INCLUDING, WITHOUT LIMITATION,

SICKNESS OR DISEASE) OR DEATH SUFFERED OR SUSTAINED BY AN EMPLOYEE OF CONTRACTOR OR ANY OF ITS AGENTS OR ITS SUBCONTRACTORS OF ANY TIER, THEN, TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR AGREES TO INDEMNIFY AND SAVE HARMLESS THE INDEMNIFIED PARTIES, FROM AND AGAINST ANY AND ALL SUCH CLAIMS, WHICH ANY AND ALL OF THEM MAY HEREAFTER SUFFER, INCUR, BE RESPONSIBLE FOR OR PAY OUT, EVEN IF THE CLAIM WAS CAUSED, OR WAS ALLEGED TO BE CAUSED, IN WHOLE OR IN PART, BY THE NEGLIGENCE, FAULT, OMISSION, STRICT LIABILITY, STRICT PRODUCTS LIABILITY, OR NEGLIGENCE PER SE, OF THE INDEMNIFIED PARTIES, IT BEING THE EXPRESS INTENT OF OWNER AND CONTRACTOR THAT CONTRACTOR SHALL BE OBLIGATED TO INDEMNIFY THE INDEMNIFIED PARTIES IN THE MANNER PROVIDED IN THIS PARAGRAPH 7.18.C EVEN FOR THE CONSEQUENCES OF THE INDEMNIFIED PARTIES' OWN NEGLIGENCE, FAULT, OMISSION, STRICT LIABILITY, STRICT PRODUCTS LIABILITY, OR NEGLIGENCE PER SE, WHETHER OR NOT IT IS OR IS ALLEGED TO BE THE SOLE OR A CONCURRING CAUSE OF THE LOSSES GIVING RISE TO THE INDEMNIFIED CLAIMS.

ARTICLE 8—OTHER WORK AT THE SITE

SC-8.02 Coordination

A. Add the following new paragraph 8.02.C immediately after Paragraph 8.02.B:

C. Owner intends to contract with others for the performance of other work at or adjacent to the Site.

1. [Here identify individual or entirety] shall have authority and responsibility for coordination of the various contractors and work forces at the Site;

2. The following specific matters are to be covered by such authority and responsibility: [Here itemize such matters];

3. The extent of such authority and responsibilities is: [Here provide the extent].

SC-8.03 Legal Relationships

A. Delete Paragraph 8.03.C in its entirety and insert the following in its place:

"C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) **INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ANY SUCH CLAIMS, AND AGAINST ALL COSTS, LOSSES, AND DAMAGES (INCLUDING BUT NOT LIMITED TO ALL FEES AND CHARGES OF ENGINEERS, ARCHITECTS, ATTORNEYS, AND OTHER PROFESSIONALS AND ALL COURT OR ARBITRATION OR OTHER DISPUTE RESOLUTION COSTS) ARISING OUT OF OR RELATING TO SUCH DAMAGE, DELAY, DISRUPTION, OR INTERFERENCE**."

SC-8.04 Claims Between Contractors

A. Supplement Article 8 by adding the following paragraph:

"8.04 *Claims between Contractors*

A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.

B. **TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER'S INDEMNITEES FROM AND AGAINST ALL CLAIMS AND INDEMNIFIED COSTS ARISING DIRECTLY, INDIRECTLY OR CONSEQUENTIALLY OUT OF ANY ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY OTHER CONTRACTOR AGAINST MEMBERS OF THE OPT TO THE EXTENT SAID CLAIM IS BASED ON OR ARISES OUT OF CONTRACTOR'S PERFORMANCE OF THE WORK. SHOULD ANOTHER CONTRACTOR CAUSE DAMAGE TO THE WORK OR PROPERTY OF CONTRACTOR OR SHOULD THE PERFORMANCE OF WORK BY ANY OTHER CONTRACTOR AT THE SITE GIVE RISE TO ANY OTHER CLAIM, CONTRACTOR SHALL NOT INSTITUTE ANY ACTION, LEGAL OR EQUITABLE, AGAINST OWNER'S INDEMNITEES OR PERMIT ANY ACTION AGAINST ANY OF THEM TO BE MAINTAINED AND CONTINUED IN ITS NAME OR FOR ITS BENEFIT IN ANY COURT OR BEFORE ANY ARBITER WHICH SEEKS TO IMPOSE LIABILITY ON OR TO RECOVER DAMAGES FROM MEMBERS OF THE OPT ON ACCOUNT OF ANY SUCH DAMAGE OR CLAIM.**

C. Contractor may submit a Change Proposal for an extension of Contract Times, in accordance with Article 11, if Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor. An extension of the Contract Times will be Contractor's exclusive remedy with respect to members of the OPT for any delay, disruption, interference, or hindrance caused by any other contractor."

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Resident Project Representative

A. Supplement Paragraph 10.03.A by adding the following subparagraph:

"1. Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work."

B. Add the following new paragraph immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings).
2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
3. *Liaison*
    a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
    b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
    c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
4. *Review of Work; Defective Work*
    a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
    b. Observe whether any Work in place appears to be defective.
    c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
5. *Inspections and Tests*
    a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
    b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
6. *Payment Requests:* Review Applications for Payment with Contractor.
7. *Completion*
    a. Participate in Engineer's visits regarding Substantial Completion.
    b. Assist in the preparation of a punch list of items to be completed or corrected.
    c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
    d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

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

ARTICLE 11—CHANGES TO THE CONTRACT

SC-11.02 Change Orders

A. Supplement Paragraph 11.02 by adding the following paragraph:

"C. Contractor assumes and bears responsibility for all costs and time delays associated with any variation from the requirements of the Contract Documents unless the variation is specifically approved by Change Order."

SC-11.11 No Damage for Delays

A. Supplement Article 11 by adding the following paragraph:

"11.11 *No Damage for Delays*

A. Contractor agrees to make no Claims for damage for delay in the performance of the Contract occasioned by any act or omission to act of the Owner, Engineer, or any of the Engineer's or Owner's agents, and agrees that any such Claim shall be fully compensated by an extension of time, as set forth in a Change Order, to complete performance of the Work as provided herein."

ARTICLE 12—CLAIMS

SC-12.01 Claims

A. Amend Paragraph 12.01.B by deleting "but in no event later than 30 days" and inserting "but in no event later than 7 days" in its place.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-13.01 Cost of the Work

A. Amend Paragraph 13.01.B by deleting the following words in the first sentence:

"commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:"

and insert the following in its place:

"those paid for the Work included in the Contract Price, and shall not include any of the costs itemized in Paragraph 13.01.C. Contractor shall provide certified payroll records listing personnel classifications and salaries for all individuals involved in additional Work. Salaries for those not included in the certified payroll will be considered as being compensated under Paragraph 13.01.C, and shall include only the following items:"

B. Amend Paragraph 13.01.B.1 by deleting the following words in the second sentence:

", without limitation, superintendents, foremen"

and inserting the following in its place:

"one foreman (unless agreed upon prior to beginning Work)"

C. Amend Paragraph 13.01.B.1 by deleting the following words in the last sentence:

"be included in the above"

and inserting the following in its place:

"not exceed 1.5 times regular pay and shall be included in the above"

D. Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

"The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of EquipmentWatch Cost Recovery Rental Rate Blue Book.

E. Amend Paragraph 13.01.C.1 by adding "superintendents" to the list of excluded personnel in the first sentence.

F. Supplement Paragraph 13.01.C.2 by adding the following sentence:

"a. For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than $500"

SC-13.03 Unit Price Work

A. Delete Paragraph 13.03.E in its entirety and insert the following in its place:

"E. *Adjustments in Unit Price*

1. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

    a. If the total cost of a particular item of Unit Price Work amounts to 20 percent or more of the total Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the Contractor differs by more than 20 percent from the estimated quantity of such item indicated in the Agreement; and

    b. If there is no corresponding adjustment with respect to any other item of Work; and

    c. If Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the Unit Price, either the Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the effect of any such variation in the quantity of the Unit Price Work performed."

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

SC-15.01 Progress Payments

A. Delete Paragraph 15.01.B.1 in its entirety and insert the following in its place:

    "1. On the first working day following the 25th of each month, Contractor shall submit to Owner for review an Application for Payment, filled out and signed by Contractor, covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents."

B. Amend Paragraph 15.01.C.1 by deleting "10" and inserting "45" in its place.

C. Replace Paragraph 15.01.D.1 in its entirety with the following:

    Payment shall be made within 30 days of presentation of the application for Payment to the Owner with Engineer's recommendation, the amount recommended (subject to any owner set-offs) will become due, and when due will be paid by Owner to Contractor.

D. Amend Paragraph 15.01.E.1 by deleting Subparagraph 15.01.E.1.l and adding the following in its place:

    "l. Owner has been notified of failure to make payments to Subcontractors or Suppliers or for labor;"

    "m. failure to submit up to date record documents as required by the Contract Documents;"

    "n. failure to submit monthly Progress Schedule updates or revised schedules as requested by the Owner or Engineer;"

    "o. failure to provide Project videos or photographs required by the Specifications;"

    "p. Other items entitle Owner to a set off against the amount recommended."

E. Amend Paragraph 15.01.E.3 by deleting "and subject to interest as provided in the Agreement."

F. Supplement Paragraph 15.01.E by adding the following subparagraph:

"4. Owner may permanently withhold payment from Contract Price for:

a. Liquidated damages incurred by Contractor.

b. Compensation for OPT for overtime charges of Design Professional, Construction Manager, Resident Project Representative, third review of submittals, review of substitutions, re inspection fees, inspections, or designs related to correction of defective Work, or other Services identified as requiring payment by the Contractor.

1) Compensation will be based on the following rates:

Position	Hourly Rate
Professional - 1	$117
Professional - 2	$141
Professional - 3	$160
Professional - 4	$184
Professional - 5	$215
Professional - 6	$246
Construction Manager - 1	$93
Construction Manager - 2	$121
Construction Manager - 3	$142
Construction Manager - 4	$179
CAD Technician/Designer - 1	$100
CAD Technician/Designer - 2	$129
CAD Technician/Designer - 3	$159
Corporate Project Support - 1	$95
Corporate Project Support - 2	$114
Corporate Project Support - 3	$152
Intern/Co-op	$58

2) Expenses will be billed at the actual cost multiplied by 1.15.

c. Costs for tests performed by the Owner to verify that Work previously tested and found to be defective has been corrected. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made."

G. Supplement Paragraph 15.01 by adding the following paragraph:

"F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment."

SC-15.03 Substantial Completion

A. Supplement Paragraph 15.03.B by adding the following subparagraph:

"1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable Set-off against payments due under this Article 15."

SC-15.06 Final Payment

A. Delete Paragraph 15.06.E in its entirety and insert the following in its place:

"E. *Final Payment Becomes Due*: The first working day following the 10th day of the second month following the submittal of the final Application for Payment and accompanying documentation, the amount recommended by the Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set offs for liquidated damages and set offs allowed under the provisions above with respect to progress payments) will become due and will be paid by Owner to Contractor."

SC-15.08 Correction Period

A. Supplement Paragraph 15.08 by adding the following paragraph:

"G. When early acceptance of a Substantially Completed portion of the Work is accomplished in the manner indicated in the Contract Documents, the correction period for that portion of the Work shall commence at the time of Substantial Completion of that Work."

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

SC-16.02 Owner May Terminate for Cause

A. Delete Subparagraphs 16.02.A.3 and 16.02.A.4 in their entirety and replace them with the following:

"3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;"

"4. Contractor's repeated disregard of the authority of Owner or Engineer;"

"5. Contractor fails to provide a replacement bond or insurance coverage as required by the General Conditions and as amended by the Supplementary Conditions; or"

"6. If any petition of bankruptcy is filed by or against Contractor, or if Contractor is adjudged as bankrupt or insolvent or makes a general assignment for the benefit of creditors, or if a receiver is appointed for the benefit of Contractor's creditors, or if a receiver is appointed on account of Contractor's insolvency, upon the occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions hereof. Failure to comply with such request within 7 days of delivery of the request shall entitle Owner to terminate this Agreement and to the accompanying rights set forth in Article 16 of the General Conditions. In all events pending receipt of adequate assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the Work with its own forces or with other contractors on a time and material or other appropriate basis. The cost of work by Owner or other contractors will be back charged against the Contract Sum hereof."

B. Delete Paragraph 16.02.G in its entirety.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

SC-17.01 Methods and Procedures

A. Delete Paragraph 17.01 in its entirety and insert the following in its place:

"17.01 *Methods and Procedures*

A. The Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law."

B. The following method of dispute resolution is identified as required by Paragraph 17.01.B of the General Conditions:

1. In accordance with NCGS §143-128(f1), any claim, dispute, or other matter in question involving greater than $15,000 arising out of or related to this Agreement shall be subject to mediation as a condition precedent to the institution of legal or equitable proceeding by either party. Owner has adopted the North Carolina State Building Commission's dispute resolution process. The process entitled "Rules Implementing Mediated Settlement Conferences in North Carolina Construction Projects" is attached to this Section.

2. For any claim, dispute, or other matter in question involving less than $15,000, the Owner and Contractor may agree to submit the matter to the dispute resolution process or exercise such rights or remedies as either may otherwise have under the Contract Documents or by Law.

C. Add the following to the end of 17.01:

C. All disputes arising under this Contract or its interpretation except those disputes covered by FEDERAL LABOR STANDARDS PROVISIONS whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10)

days of commencement of the dispute, be presented by the Contractor to the Owner for decision. Any claim not presented within the time limit specified in this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt of the Owner.

D. The Contractor shall submit in detail his claim and his proof thereof.

E. If the Contractor does not agree with any decision of the Owner, he shall in no case allow the dispute to delay the work but shall notify the Owner promptly that he is proceeding with the work under protest.

F. Venue for disputes shall lie exclusively in Orange County, Texas and none other.

ARTICLE 18—MISCELLANEOUS

SC-18.02 Computation of Times

A. Supplement Paragraph 18.02 by adding the following paragraph:

"B. All references and conditions for a "Calendar Day Contract" in the General Conditions and Supplementary Conditions shall apply for a "Fixed Date Contract." A "Fixed Date Contract" is one in which the calendar dates for reaching Substantial Completion and/or final completion are specified in lieu of identifying the actual calendar days involved."

SC-18.10 Headings

A. Delete Paragraph 18.08.A in its entirety and insert the following in its place:

"A. The Article and paragraph headings in this Agreement are inserted for convenience only and do not constitute parts of these General Conditions or act as a limitation of the scope of the particular section to which they refer. This Agreement will be fairly interpreted in accordance with its terms and conditions and not for or against either party."

SC-18.09 Independent Contractor

A. Supplement Article 18 by adding the following paragraph:

"18.11 *Independent Contractor*

A. Each Party will perform its duties under this Agreement as an independent contractor. The Parties and their personnel will not be considered to be employees or agents of the other Party. Nothing in this Agreement will be interpreted as granting either Party the right or authority to make commitments of any kind for the other. This Agreement will not constitute, create, or be interpreted as a joint venture, partnership, or formal business organization of any kind."

SC-18.11 Contractor's Field Office

The contractor shall furnish and maintain, during construction of the Improvements embraced in this Contract adequate facilities on the Project area or adjacent thereto for the use of the Local Public Agency and its Engineers as described below:

1. Engineers Field Office: Office is not required for this project.
2. Contractors Office: A field office is not required for this project, however the Contractor shall have readily accessible copies of plans and contract documents and working drawings shall be kept on site. Provide cell phone, emails, and other communications for all superintendents, foreman, and project managers.

SC-18.12 Severability

A. Supplement Article 18 by adding the following paragraph:

"18.12 *Severability*

A. If a court of competent jurisdiction renders any part of this Agreement invalid or unenforceable, that part will be severed and the remainder of this Agreement will continue in full force and effect."

SC-18.13 No Third Party Beneficiaries

A. Supplement Article 18 by adding the following paragraph:

"18.13 *No Third Party Beneficiaries*

A. Nothing in this Agreement shall be construed to create any right in any third party not a signatory to this Agreement, and the parties do not intend to create any third party beneficiaries by entering into this Agreement."

SC-18.14 Sovereign Immunity

A. Supplement Article 18 by adding the following paragraph:

"18.14 *Sovereign Immunity*

A. The parties agree that the Owner has not waived its sovereign immunity by entering into and performing its obligations under this Agreement."

END OF SECTION

DIVISION 01

GENERAL REQUIREMENTS

01 11 00 SUMMARY OF WORK

1.00 GENERAL

1.01 WORK INCLUDED

A. Construct Work as described in the Contract Documents.

1. Provide the materials, equipment, and incidentals required to make the Project completely and fully operable.
2. Provide the labor, equipment, tools, and consumable supplies required for a complete Project.
3. Provide the civil, architectural, structural, mechanical, electrical, instrumentation and all other Work required for a complete and operable Project.
4. Install Owner furnished equipment – 60 kW generator and external fuel tank, and automatic transfer switch and place in operation.
5. Test and place the completed Project in operation.
6. Provide the special tools, spare parts, lubricants, supplies, or other materials as indicated in Contract Documents for the operation and maintenance of the Project.
7. The Contract Documents do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer.

1.02 JOB CONDITIONS

A. The General Conditions, the Supplementary Conditions, and General Requirements apply to each Section of the Specifications.

B. Comply with all applicable state and local codes and regulations pertaining to the nature and character of the Work being performed.

1.03 DESCRIPTION OF WORK

A. Work is described in general, non-inclusive terms as:

1. Provide construction and installation of all electrical equipment and modifications and all improvements as shown or specified in the contract documents and all support work for a complete and operating system except for the work included in the items below.
2. Replacement of the incoming utility electrical service to the Spillway.
3. Installation of manual transfer switch for portable generator connection at the Spillway electrical service location.
4. Installation of Owner furnished equipment: 60kW generator, automatic transfer switch and external fuel tank at the Spillway Control Room.
5. Replacement of the canopy lighting for all gates.
6. Replacement of the gate control panels and all associated electrical for all gates at the Spillway.

7. Replacement of the power distribution equipment – panelboards, and transformer in the Spillway Control House
8. Replacement of the control equipment – relief wells pumps No.4 and No.10 motor starters panel and relief well pumps No.4 and No.10 level control panel.

1.04 CONSTRUCTION OF UTILITIES

A. Power and Electrical Services:

1. When permanent power is available at the Site, the Contractor may use this power source in lieu of temporary power source previously used.
    a. Notify Engineer and Owner of intent to use the permanent power source.
    b. Arrange with the power utility and pay the charges for connections and monthly charges for use of this power.
2. Pay for the power consumed until the Project has been accepted as substantially complete.

1.05 OCCUPANCY

A. As soon as any portion of the structure and equipment are ready for use, the Owner shall have the right to occupy or operate that portion upon written notice to the Contractor.

B. Testing of equipment and appurtenances including specified test periods, training, and startup does not constitute acceptance for operation.

C. Owner may accept the facility for continued use after startup and testing at the option of the Owner. If acceptance is delayed at the option of the Owner, shut down facilities per approved Operation and Maintenance procedures.

D. The execution of bonds is understood to indicate the consent of the surety to these provisions.

E. Provide an endorsement from the insurance carrier permitting occupancy of the structures and use of equipment during the remaining period of construction.

F. Conduct operations to insure the least inconvenience to the Owner and general public.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials and products per the individual Sections of the Specifications.

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 26 00 CHANGE MANAGEMENT

PART 1 - GENERAL

1.01 REQUESTS FOR CHANGE PROPOSAL

A. Construction Manager will initiate Modifications by issuing a Request for Change Proposal (RCP).

1. Construction Manager and Design Professional will prepare a description of proposed Modifications.

2. Construction Manager will issue the Request for Change Proposal form to Contractor. A number will be assigned to the Request for a Change Proposal when issued.

3. Return a Change Proposal in accordance with Paragraph 1.02 for evaluation by the OPT.

1.02 CHANGE PROPOSALS

A. Submit a Change Proposal (CP) to the Construction Manager for Contractor initiated changes in the Contract Documents or in response to a Request for Change Proposal. Submit the Change Proposal and attach the forms provided by the Construction Manager.

1. Use the Change Proposal form provided by the Construction Manager.

2. Include with the Change Proposal:

a. A complete description of the proposed Modification if Contractor initiated or proposed changes to the OPT's description of the proposed Modification.

b. The reason the Modification is requested, if not in response to a Request for a Change Proposal.

c. A detailed breakdown of the cost of the change if the Modification requires a change in Contract Price. The itemized breakdown is to include:

1) List of materials and equipment to be installed;

2) Man hours for labor by classification;

3) Equipment used in construction;

4) Consumable supplies, fuels, and materials;

5) Royalties and patent fees;

6) Bonds and insurance;

7) Overhead and profit;

8) Field office costs;

9) Home office cost; and

10) Other items of cost.

d. Provide the level of detail outlined in the paragraph above for each Subcontractor or Supplier actually performing the Work if Work is to be provided by a

Subcontractor or Supplier. Indicate appropriate Contractor mark ups for Work provided through Subcontractors and Suppliers. Provide the level of detail outlined in the paragraph above for self-performed Work.

e. Submit Change Proposals that comply with the General Conditions for Cost of Work.

f. Provide a revised schedule. Show the effect of the change on the Project Schedule and the Contract Times.

B. Submit a Change Proposal to the Construction Manager to request a Field Order.

C. A Change Proposal is required for all substitutions or deviations from the Contract Documents.

D. Request changes to products in accordance with Section 01 33 00 “Document Management.”

1.03 CONSTRUCTION MANAGER WILL EVALUATE THE REQUEST FOR A MODIFICATION

A. Construction Manager will issue a Modification per the General Conditions if the Change Proposal is acceptable to the Owner. Construction Manager will issue a Change Order or Contract Amendment for any changes in Contract Price or Contract Times.

1. Change Orders and Contract Amendments will be sent to the Contractor for execution with a copy to the Owner recommending approval. A Work Change Directive may be issued if Work needs to progress before the Change Order or Contract Amendment can be authorized by the Owner.

2. Work Change Directives, Change Orders, and Contract Amendments can only be approved by the Owner.

a. Work performed on the Change Proposal prior to receiving a Work Change Directive or approval of the Change Order or Contract Amendment is performed at the Contractor’s risk.

b. No payment will be made for Work on Change Orders or Contract Amendments until approved by the Owner.

B. Contractor may be informed that the Change Proposal is not approved and construction is to proceed in accordance with the Contract Documents.

1.04 EQUAL NON-SPECIFIED PRODUCTS

A. The products of the listed manufacturers are to be furnished where the Specifications list several manufacturers and do not specifically list “or equal” or “or approved equal” products. Use of any products other than those specifically listed is a substitution. Follow the procedures in Paragraph 1.05 for a substitution.

B. Contractor may submit other manufacturers’ products that are in full compliance with the Specifications where Specifications list one or more manufacturers followed by the phrase “or equal” or “or approved equal.”

1. Submit a Shop Drawing as required by Section 01 33 02 “Shop Drawings” to document that the proposed product is equal or superior to the specified product.

2. Prove that the product is equal. It is not the OPT's responsibility to prove the product is not equal.

    a. Indicate on a point-by-point basis for each specified feature that the product is equal to the Contract Document requirements.

    b. Make a direct comparison with the specified manufacturer's published data sheets and available information. Provide this printed material with the Shop Drawing.

    c. The decision of the Design Professional regarding the acceptability of the proposed product is final.

3. Provide a certification that, in furnishing the proposed product as an equal, the Contractor:

    a. Has thoroughly examined the proposed product and has determined that it is equal or superior in all respects to the product specified.

    b. Has determined that the product will perform in the same manner and result in the same process as the specified product.

    c. Will provide the same warranties and/or bonds as for the product specified.

    d. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the product into the construction and will waive all claims for additional Work which may be necessary to incorporate the product into the Project which may subsequently become apparent.

    e. Will maintain the same time schedule as for the specified product.

C. A Change Proposal is not required for any product that is in full compliance with the Contract Documents. If the product is not in full compliance, it may be offered as a Substitution.

1.05 SUBSTITUTIONS

A. Substitutions are defined as any product that the Contractor proposes to provide for the Project in lieu of the specified product. Submit a Change Proposal per Paragraph 1.02 along with documents required for a Shop Drawing as required by Section 01 33 02 "Shop Drawings" to request approval of a substitution.

B. Prove that the product is acceptable as a substitute. It is not the Design Professional's responsibility to prove the product is not acceptable as a substitute.

1. Indicate on a point-by-point basis for each specified feature that the product is acceptable to meet the intent of the Contract Documents requirements.

2. Make a direct comparison with the specified Suppliers published data sheets and available information. Provide this printed material with the Shop Drawing.

3. The decision of the Design Professional regarding the acceptability of the proposed substitute product is final.

C. Provide a certification that, in making the substitution request, the Contractor:

1. Has determined that the substituted product will perform in substantially the same manner and result in the same ability to meet the specified performance as the specified product;

2. Will provide the same warranties and/or bonds for the substituted product as specified or as would be provided by the manufacturer of the specified product;

3. Will assume all responsibility to coordinate any modifications that may be necessary to incorporate the substituted product into the Project and will waive all claims for additional Work which may be necessary to incorporate the substituted product into the Project which may subsequently become apparent; and

4. Will maintain the same time schedule as for the specified product.

D. Pay for review of substitutions in accordance with Section 01 33 02 “Shop Drawings.”

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 29 00 PAYMENT PROCEDURES

1.00 GENERAL

1.01 WORK INCLUDED

A. Payments for Work shall conform to the provisions of theGeneral Conditions, the Supplementary Conditions, the Agreement, and this Section. Apply provisions for payments in the Section to all Subcontractors and Suppliers.

B. Submit Applications for Payment at the amounts indicated in the Agreement:

1. Amounts for each item in the Agreement shall include but not be limited to cost for:

a. Mobilization, demobilization, cleanup, bonds, and insurance.

b. Professional services including but not limited to engineering and legal fees.

c. The products to be permanently incorporated into the Project.

d. The products consumed during the construction of the Project.

e. The labor and supervision to complete the Project.

f. The equipment, including tools, machinery, and appliances required to complete the Project.

g. The field and home office administration and overhead costs related directly or indirectly to the Project.

h. Any and all kinds, amount or class of excavation, backfilling, pumping or drainage, sheeting, shoring and bracing, disposal of any and all surplus materials, permanent protection of all overhead, surface or underground structures; removal and replacement of any poles, conduits, pipelines, fences, appurtenances and connections, cleaning up, overhead expense, bond, public liability and compensation and property damage insurance, patent fees, and royalties, risk due to the elements, and profits, unless otherwise specified.

2. Provide Work not specifically set forth as an individual payment item but required to provide a complete and functional system. These items are a subsidiary obligation of the Contractor and are to be included in the Cost of Work.

3. Payment will be made for materials on hand.

a. Store materials properly on Site per Section 01 31 00 “Project Management and Coordination.”

1). Payment will be made for the invoice amount less the specified retainage.

2). Provide invoices at the time materials are included on the materials-on-hand tabulation.

b. Provide documentation of payment for materials-on-hand with the next payment request. Adjust payment to the amount actually paid if this differs from the invoice amount. Remove items from the materials on hand tabulation if this documentation is not provided so payment will not be made.

c. Payment for materials-on-hand is provided for the convenience of the Contractor and does not constitute acceptance of the product.

4. The Work covered by progress payments becomes the property of the Owner at the time of payment.

1.02 SCHEDULE OF VALUES AND PAYMENTS

A. Submit a detailed Schedule of Values for the Work to be performed on the project.

1. Submit schedule within 10 days prior to submitting the first Application for Payment.
2. Line items in the Agreement are to be used as line items in the schedule.
3. Payment will be made on the quantity of Work completed per Contract Documents during the payment period and as measured per this Section.
    a. Payment amount is the Work quantity measured multiplied by the unit prices for that line item in the Agreement.
    b. Payment on a unit price basis will not be made for Work outside finished dimensions shown in the Contract Documents.
    c. Partial payments will be made for lump sum line items in the Agreement.
        1). Lump sum line items in the Agreement are to be divided into smaller unit prices to allow more accurate determination of the percentage of the item that has been completed.
            a). Provide adequate detail to allow more accurate determination of the percentage of Work completed for each item.
            b). Provide amounts for items that do not exceed $50,000.00. An exception may be made for equipment packages that cannot be subdivided into units or subassemblies.
            c). Separate product costs and installation costs.
                (1). Product costs include cost for product, delivery and unloading costs, royalties and patent fees, taxes, and other cost paid directly to the Subcontractor or Supplier.
                (2). Installation costs include cost for the supervision, labor and equipment for field fabrication, erection, installation, start-up, initial operation and overhead and profit.
            d). Lump sum items may be divided into an estimated number of units.
                (1). The estimated number of units times the cost per unit must equal the lump sum amount for that line item.
                (2). Payment will be made for all of the lump sum line item amount.
                (3). Include a directly proportional amount of overhead and profit for each line item.

(4). Divide principal subcontract amounts into an adequate number of line items to allow determination of the percentage of Work completed for each item.

2). These line items may be used to establish the value of Work to be added or deleted from the Project.

3). Correlate line items with other administrative schedules and forms:

a). Progress schedule.

b). List of Subcontractors.

c). Schedule of allowances.

d). Schedule of alternatives.

e). List of products and principal Suppliers.

f). Schedule of Submittals.

4). Costs for mobilization/demobilization are to be listed as a separate line item and includes the actual cost for:

a). Bonds and insurance.

b). Transportation and setup for equipment.

c). Transportation and/or erection of all field offices, sheds and storage facilities.

d). Salaries for preparation of submittals required before the first Application for Payment.

e). Salaries for field personnel assigned to the Project related to the mobilization/demobilization of the Project.

f). Transportation, breakdown/loading, and removal of equipment.

g). Transportation and/or disassembly of all temporary facilities erected for construction.

(1). Mobilization/demobilization may not exceed 3 percent of the total Contract amount. Cost for mobilization and demobilization may be submitted only for Work completed.

5). The sum of all values listed in the schedule must equal the total Contract amount.

4. Submit a schedule indicating the anticipated schedule of payments to be made by the Owner. Schedule shall indicate:

a. The Application for Payment number.

b. Date the request is to be submitted.

c. Anticipated amount of payment to be requested.

5. Update the Schedule of Values quarterly or more often if necessary to provide a reasonably accurate indication of the funds that the Owner will need to have available to make payment to the Contractor for the Work performed.

B. Provide written approval of the Schedule of Values, Application for Payment form, and method of payment by the Surety Company providing performance, and bonds prior to submitting the first Application for Payment. Payment will not be made without this approval.

1.03 PAYMENT PROCEDURES

A. Submit Applications for Payment per the procedures indicated in Section 01 33 00 "Submittal Procedures." Submit a Schedule of Values in the Application for Payment format to be used.

B. Applications for Payment may be submitted on a pre-printed form as indicated in Section 01 31 13.13 "Forms" or may be generated by computer. Computer generated payment requests must have the same format and information indicated in the pre-printed form and be approved by the Engineer.

1. Indicate the total contract amount and the Work completed to date on the Tabulation of Values for Original Contract Performed (Attachment "A.").

2. Include only approved Change Order items in the Tabulation of Extra Work on Approved Change Orders (Attachment "B.").

3. List all materials on hand that are presented for payment on the Tabulation of Materials on Hand (Attachment "C.") Once an item has been entered on the tabulation it is not to be removed.

4. Include the Project Summary Report (Attachment "D") with each Application for Payment. Data included in the Project Summary Report are to be taken from the other tabulations. Include a completed summary as indicated in with each Applications for Payment submitted.

    a. Number each application sequentially and indicate the payment period. Revised Applications for Payment will be resubmitted as A, B, C and so forth to note changes in content.

    b. Show the total amounts for value of original Contract performed, extra Work on approved Change Orders, and materials on hand on the Project Summary Report. Show total amounts that correspond to totals indicated on the attached tabulation for each.

    c. Note the number of pages in tabulations in the blank space on the Project Summary Report to allow a determination that all sheets have been submitted.

    d. Execute Contractor's certification by the Contractor's agent of authority and notarize for each Application for Payment.

5. Do not alter the schedule of values and the form for the submission of requests without the written approval of the Engineer once these have been approved by the Engineer.

6. Final payment requires additional procedures and documentation per Section 01 70 00 "Execution and Closeout Requirements."

C. Progress payments shall be made as the Work progresses on a monthly basis.

1. End the payment period on the day indicated in the Agreement and submit an Application for Payment for Work completed and materials received since the end of the last payment period.

2. At the end of the payment period, submit a draft copy of the Application for Payment for that month to the Engineer. Agreement is to be reached on:

a. The percentage of Work completed for each lump sum item.

b. The quantity of Work completed for each unit price item.

c. The percentage of Work completed for each approved Change Order item.

d. The amount of materials-on-hand.

3. On the basis of these agreements the Contractor is to prepare a final copy of the Application for Payment and submit it to the Engineer for approval.

4. The Engineer will review the Application for Payment and if appropriate will recommend payment of the application to the Owner.

D. Provide a revised and up-to-date Progress Schedule per Section 01 32 16 “Construction Progress Schedules” with each Application for Payment.

E. Provide project photographs per Section 01 32 33 “Photographic Documentation” with each Application for Payment.

1.04 MEASUREMENT PROCEDURES

A. Measure the Work described in the Agreement for payment. Payment will be made only for the actual measured and/or computed length, area, solid contents, number and weight, unless otherwise specifically provided. No extra or customary measurements of any kind will be allowed.

1.05 BASIS OF PAYMENT

A. The Basis of Payment will be as established in the Contract Documents and as described below:

1. BID ITEM 1 – Cost of Performance and Payment Bonds and Cost of Insurance

a. No measurement for this bid item shall be made. Payment shall be made at the lump sum (LS) price bid stated in the Proposal. It shall be paid on the first application for payment.

2. BID ITEM 2 – MOBILIZATION

a. No measurement for this bid item shall be made. Payment shall be made at the lump sum (LS) price bid stated in the Proposal and shall include the mobilization and de-mobilization of personnel, equipment and supplies to/from the project site in preparation for beginning and finishing work on other contract items or in instances where work must be suspended because of weather events or emergencies. 50% of this item will be paid upon mobilization on site. The remaining 50% will be paid upon de-mobilization at substantial completion. Mobilization will be paid upon contractor’s deployment to the site. Mobilization shall include, but is not limited to,

the movement of equipment, personnel, materials, supplies, etc. to the project site; the establishing of Contractor's office and other facilities necessary including restroom facilities; the establishment of the staging and laydown areas with fencing, gates, lighting, washout area, chemical and fuel storage area, etc.; and any preliminary engineering and administrative work performed prior to beginning the Work. The amount bid for Mobilization and De-Mobilization shall not exceed five percent (5%) of the total amount bid, exclusive of this item.

3. BID ITEM 3 – SPILLWAY ELECTRICAL IMPROVEMENTS

    a. No measurement for this bid item shall be made. Payment shall be made at the lump sum (LS) price bid stated in the Proposal and shall include, but is not limited to, all labor, material, equipment, transportation, submittals, and incidentals required for electrical improvements at the spillway as shown on the plans which shall include demolition of incoming electrical service and installation of new electrical service with manual transfer switch and portable generator connection, demolition of existing generator and fuel tank, demolition of existing gate control panels, replacement of gate control panels, replacement of the following: 480V panelboard, 208Y/120V panelboard, 75kVA step-down transformer, , relief well pumps No.4 and No.10 starter panel, and relief wells No.4 and No.10 level control panel in the Spillway Control Room, installation of Owner furnished equipment: 60kW generator, external fuel tank and automatic transfer switch, including all associated fuel lines, generator exhaust piping, fuel pumps at the Spillway Control Room and furnishing and installing new cable and conduit as required for a complete and operational system in place in accordance with the Contract Documents.

4. BID ITEM 5 – CANOPY LIGHTS

    a. No measurement for this bid item shall be made. Payment shall be made at the lump sum (LS) price bid stated in the Proposal and shall include, but is not limited to, all labor, material, equipment, transportation, submittals, and incidentals required for the demolition of the existing canopy lights at each gate and the installation, testing and start-up of the new canopy lights and installing all associated cable and conduit as shown on the plans as required for a complete and operational system in place in accordance with the Contract Documents.

5. BID ITEM 7 – REMOBILIZATION TO INSTALL OWNER FURNISHED EQUIPMENT

    a. No measurement for this bid item shall be made. Payment shall be made at the lump sum (LS) price bid stated in the Proposal and shall include, but is not limited to, all labor, material, equipment, transportation, submittals, and incidentals required for Contractor to remobilize to install the Owner furnished equipment after the duration of the Construction Contract has expired.

6. BID ITEM 8 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

    a. SWPPP measurement shall be lump sum (LS) price stated in the Proposal and shall be full compensation and shall include furnishing and installing completely, according to LDEQ requirements. Payment for lump sum bid items shall be made.

2.00 PRODUCTS

3.00 EXECUTION

END OF SECTION

01 31 00 PROJECT MANAGEMENT AND COORDINATION

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish equipment, manpower, products, and other items necessary to complete the Project with an acceptable standard of quality and within the Contract time. Construct Project in accordance with current safety practices.

B. Manage Site to allow access to Site and control construction operations.

C. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.

D. Construct temporary impounding works, channels, diversions, furnishing and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project.

E. Provide temporary controls for pollutions, management of water and management of excess earth as required in Section 01 57 00 “Temporary Controls.”

F. Cost for Project Management and Coordination as described in this section are to be included in the Contract Price.

1.02 QUALITY ASSURANCE

A. Employ competent workmen, skilled in the occupation for which they are employed. Provide Work meeting quality requirements of the Contract Documents as determined by the Engineer and Owner.

B. Remove defective Work from the Site immediately unless provisions have been made and approved by the Engineer to allow repair of the product at the Site. Clearly mark the Work as "defective" until it is removed or allowable repairs have been completed.

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 “Document Management.”

1. Provide copies of Supplier’s printed storage instructions prior to furnishing materials or products and installation instructions prior to beginning the installation. Maintain one copy of these documents at the Site until the Project is complete. Incorporate this information into submittals.

2. Incorporate field notes, sketches, recordings, and computations made by the Contractor in Record Drawings.

1.04 STANDARDS

A. Perform Work to comply with local, State and Federal ordinances and regulations.

1.05 PERMITS

A. Obtain a building permit for the Project from the local authorities having jurisdiction. All permits and fees will be paid by the Contractor.

B. Retain copies of permits and licenses at the Site and observe and comply with all regulations and conditions of the permit or license, including additional insurance requirements.

C. Obtain and pay for all other necessary permits including any and all necessary highway, street and road permits for transporting pipe and/or heavy equipment necessary for construction of the Project.

D. Obtain and pay for other permits necessary to conduct any part of the Work.

E. Arrange for inspections and certification by agencies having jurisdiction over the Work.

F. Make arrangements with private utility companies and pay for fees associated with obtaining services, or for inspection fees.

1.06 SAFETY REQUIREMENTS

A. Assume sole responsibility for safety at the Site. Protect the safety and welfare of persons at the Site.

B. Provide safe access to move through the Site. Provide and maintain barricades, guard rails, covered walkways, and other protective devices to warn and protect from hazards at the Site.

C. Comply with latest provisions of the Occupational Health and Safety Administration and other regulatory agencies in performing Work.

D. Cooperate with accident investigations related to the Site. Provide two copies of all reports, including insurance company reports, if requested by the Owner, prepared concerning accidents, injury, or death on the Site to the Engineer as Record Data per Section 01 33 00 “Submittal Procedures.”

1.07 COORDINATION

A. Coordinate the Work of various trades having interdependent responsibilities for installing, connecting to, and placing equipment in service.

B. Coordinate requests for substitutions to provide compatibility of space, operating elements, effect on the Work of other trades, and on the Work scheduled for early completion.

C. Coordinate the use of Project space and the sequence of installation of equipment, elevators, walks, mechanical, electrical, plumbing, or other Work that is indicated diagrammatically on the Drawings.

1. Follow routings shown for tubes, pipes, ducts, conduits, and other items as closely as practical, with due allowance for available physical space.

2. Utilize space efficiently to maximize accessibility for Owner’s maintenance and repairs.

3. Schematics are diagrammatic in nature. Adjust routing of piping, ductwork, utilities, and location of equipment as needed to resolve spatial conflicts between the various trades. Document the actual routing on the Record Drawings.

D. Conceal ducts, pipes, wiring, and other non-finish items in finished areas, except as otherwise shown. Coordinate locations of concealed items with finish elements.

E. Coordinate with architectural reflected ceiling plans the exact location and dimensioning of items which occur within hung ceilings. Request clarification from the Engineer prior to proceeding with fabrication or installation if a conflict exists.

F. Schedule construction activities in sequence required to obtain best results where installation of one part of the Work is dependent on installation of other components, either before or after its own installation.

G. Make adequate provisions to accommodate items scheduled for later installation, including:

1. Accepted alternates.
2. Installation of products purchased with allowances.
3. Work by others.
4. Owner-supplied, Contractor-installed items.

H. Sequence, coordinate, and integrate the various elements of mechanical, electrical, and other systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical and electrical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction.
4. Coordinate the installation of required supporting devices and sleeves to be set in cast-in-place concrete and other structural components, as they are constructed.
5. Install systems, materials, and equipment as permitted by codes to provide the maximum headroom possible where mounting heights are not detailed or dimensioned.
6. Coordinate the connection of systems with exterior underground and overhead utilities and services. Comply with the requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to the greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Adjust routing of piping, ductwork, utilities, and location of equipment as needed to resolve spatial conflicts between the various trades. Document changes in the indicated routings on the Record Drawings.
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
9. Install systems, materials, and equipment to facilitate servicing, maintenance, and repair or replacement of components. As much as practical, connect for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to accessible locations.

10. Install access panel or doors where units are concealed behind finished surfaces.

11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

1.08 CONTRACTOR'S USE OF SITE

A. Limit the use of Site for Work and storage to those areas designated on the Drawings or approved by the Engineer. Coordinate the use of the premises with the Engineer.

B. Repair or correct any damage to existing facilities, including contamination, caused by the Contractor's personnel, visitors, materials, or equipment.

C. Do not permit alcoholic beverages or illegal substances on the Site. Do not allow persons under the influence of alcoholic beverages or illegal substances to enter or remain on the Site at any time. Persons on Site under the influence of alcoholic beverages or illegal substances will be permanently prohibited from returning to the Site. Criminal or civil penalties may also apply.

D. Park construction equipment in designated areas only and provide spill control measures as discussed in Section 01 57 00 "Temporary Controls."

E. Park employees' vehicles in designated areas only.

F. Obtain written permission of the Owner before entering privately-owned land outside of the Owner's property, rights-of-way, or easements.

G. Do not allow the use of audio devices, obnoxious, vulgar or abusive language, or sexual harassment in any form. These actions will cause immediate and permanent removal of the offender from the premises. Criminal or civil penalties may apply.

H. Require Workers to wear clothing that is inoffensive and meets safety requirements. Do not allow sleeveless shirts, shorts, exceedingly torn, ripped or soiled clothing to be worn on the project.

I. Do not allow firearms or weapons of any sort to be brought on to the Site under any conditions. No exception is to be made for persons with concealed handgun permits. Remove any firearms or weapons and the person possessing these firearms or weapons permanently and immediately from the Site.

1.09 ACCESS TO THE SITE

A. Maintain access to the facilities at all times. Do not obstruct roads, pedestrian walks, or access to the various buildings, structures, stairways, or entrances. Provide safe temporary walks or other structures to allow access for normal operations during construction.

B. Provide adequate and safe access for inspections. Leave ladders, bridges, scaffolding and protective equipment in place until inspections have been completed. Construct additional safe access if required for inspections.

C. Provide security at the Site as necessary to protect against vandalism and loss by theft.

D. Use State, County, Parish or City roadways for construction traffic only with written approval of the appropriate representatives of each entity. State, County, Parish, or City roadways may not all be approved for construction traffic. Obtain written approval to use State,

County, Parish, City or private roads to deliver heavy equipment to the Site. Copies of the written approvals must be furnished to the Owner as Record Data before Work begins. No additional compensation will be paid because the Contractor is unable to gain access to the easement from public roadways.

1.10 PROPERTY PROVISIONS

A. Make adequate provisions to maintain the flow of storm sewers, sanitary sewers, drains and water courses encountered during the construction. Provide temporary service around the construction or otherwise construct the structure in a manner that the flow is not curtailed. Restore structures which may have been disturbed during construction to their original position as soon as construction in the area is completed.

B. Protect trees, fences, signs, poles, guy wires, and all other property unless their removal is authorized. Restore any property damaged to equal or better condition per Paragraph 1.11 of this Section.

1.11 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. Examine the Site and review the available information concerning the Site. Locate utilities, streets, driveways, fences, drainage structures, sidewalks, curbs, and gutters. Verify the elevations of the structures adjacent to excavations. Report these to the Engineer before beginning construction.

B. Determine if existing structures, poles, piping, or other utilities at excavations will require relocation or replacement. Prepare a Plan of Action per Section 01 35 00 “Special Procedures.” Coordinate Work with Contractor, local utility company and others. Include cost of demolition and replacement, restoration or relocation of these structures in the Cost of Work.

C. Protect buildings, utilities, street surfaces, driveways, sidewalks, curb and gutter, fences, wells, drainage structures, piping, valves, manholes, electrical conduits, and other systems or structures unless they are shown to be replaced or relocated on the Drawings. Restore damage to items to be protected to the satisfaction of the Engineer, utility owner and Owner without additional compensation from the Owner.

D. Carefully support and protect all structures and/or utilities so that there will be no failure or settlement where excavation or demolition endangers adjacent structures and utilities. Do not take existing utilities out of service unless shown in the Contract Documents or approved by the Engineer. Notify and cooperate with the utility owner if it is necessary to move services, poles, guy wires, pipelines or other obstructions. Include the cost of relocation and permits required to move existing utilities in the Cost of Work.

E. Protect existing trees and landscaping at the site.

1. Visit the Site with Engineer to identify trees that may be removed during construction.

2. Mark trees to be removed with paint.

3. Protect trees to remain from damage by wrapping trunks with 2 x 4 timbers around the perimeter, securely wired in place, where machinery must operate around existing trees. Protect branches and limbs from damage by equipment.

F. Protect buildings from damage when handling material or equipment. Protect finished surfaces, including floors, doors, and jambs. Remove doors and install temporary wood protective coverings over jambs.

1.12 DISRUPTION TO SERVICES / CONTINUED OPERATIONS

A. Existing facilities are to continue in service as usual during the construction unless noted otherwise. Owner or utilities must be able to operate and maintain the facilities. Disruptions to existing utilities, piping, process piping, or electrical services shall be kept to a minimum.

1. Do not restrict access to critical valves, operators, or electrical panels.
2. Do not store material or products inside structures.
3. Limit operations to the minimum amount of space needed to complete the specified Work.
4. Maintain storm sewers and sanitary sewers in service at all times. Provide temporary service around the construction or otherwise construct the structure in a manner that the flow is not restricted.

B. Provide a Plan of Action in accordance with Section 01 35 00 “Special Procedures” if facilities must be taken out of operation.

1.13 FIELD MEASUREMENTS

A. Perform complete field measurements for products required to fit existing conditions prior to purchasing products or beginning construction.

B. Verify property lines, control lines, grades, and levels indicated on the Drawings.

C. Verify pipe class, equipment capacities, existing electrical systems and power sources for existing conditions.

D. Verify electrical equipment will fit in existing room, walls, etc. prior to submitting formal submittals.

E. Check Shop Drawings and indicate the actual dimensions available where products are to be installed.

F. Include field measurements in Record Drawings as required in Section 01 31 13 “Project Coordination.”

1.14 REFERENCE DATA AND CONTROL POINTS

A. Any control points required for the project are the responsibility of the Contractor.

B. Locate and protect control points prior to starting the Work and preserve permanent reference points during construction. Do not change or relocate points without prior approval of the Engineer. Notify Engineer when the reference point is lost, destroyed, or requires relocation. Replace Project control points on the basis of the original survey.

C. Provide complete engineering layout of the Work needed for construction.

1. Provide competent personnel. Provide equipment including accurate surveying instruments, stakes, platforms, tools, and materials.
2. Provide surveying with accuracy meeting the requirements established for Category 5 Construction Surveying as established in the Manual of Practice of Land Surveying in Louisiana published by the Louisiana Society of Professional Surveyors, latest revision.
3. Record data and measurements per standards.

1.15 DELIVERY AND STORAGE

A. Deliver products and materials to the Site in time to prevent delays in construction.

B. Deliver packaged products to Site in original undamaged containers with identifying labels attached. Open cartons as necessary to check for damage and to verify invoices. Reseal cartons and store properly until used. Leave products in packages or other containers until installed.

C. Deliver products that are too large to fit through openings to the Site in advance of the time enclosing walls and roofs are erected. Set in place, raised above floor on cribs.

D. Assume full responsibility for the protection and safekeeping of products stored at the Site.

E. Store products at locations acceptable to the Engineer and to allow Owner access to maintain and operate existing facilities.

F. Store products in accordance with the Supplier's storage instructions immediately upon delivery. Leave seals and labels intact. Arrange storage to allow access for maintenance of stored items and for inspection. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

G. Obtain and pay for the use of any additional storage areas as needed for construction. Store products subject to damage by elements in substantial weather-tight enclosures or storage sheds. Provide and maintain storage sheds as required for the protection of products. Provide temperature, humidity control and ventilation within the ranges stated in the Supplier's instructions. Remove storage facilities at the completion of the Project.

H. Protect the pipe interior. Keep all foreign materials such as dirt, debris, animals, or other objects out of the pipe during the Work. Cap or plug ends of installed pipe in an approved manner when pipe is not being installed. Clean or wash out pipe sections that become contaminated before continuing with installation. Take precautions to prevent the pipe from floating or moving out of the proper position during or after laying operations. Immediately correct any pipe that moves from its correct position.

I. Provide adequate exterior storage for products that may be stored out-of-doors.

1. Provide substantial platforms, blocking, or skids to support materials and products above ground; slope to provide drainage. Protect products from soiling or staining.
2. Cover products subject to dislocation or deterioration from exposure to the elements, with impervious sheet materials. Provide ventilation to prevent condensation below covering.
3. Store loose, granular materials on clean, solid surfaces, or on rigid sheet materials, to prevent mixing with foreign matter.

4. Provide surface drainage to prevent erosion and ponding of water.
5. Prevent mixing of refuse or chemically injurious materials or liquids with stored materials.
6. Pipes and conduits stored outdoors are to have open ends sealed to prevent the entrance of dirt, moisture, and other injurious materials. Protect PVC pipe from ultraviolet light exposure.
7. Store light weight products to prevent wind damage.

J. Protect and maintain mechanical and electrical equipment in storage.
1. Provide Supplier's service instructions on the exterior of the package.
2. Service equipment on a regular basis as recommended by the Supplier. Maintain a log of maintenance services. Submit the log as Record Data at the completion of the Project.
3. Provide power to and energize space heaters for all equipment for which these devices are provided.
4. Provide temporary enclosures for all electrical equipment, including electrical systems on mechanical devices. Provide and maintain heat in the enclosures until equipment is energized.

K. Maintain storage facilities. Inspect stored products on a weekly basis and after periods of severe weather to verify that:
1. Storage facilities continue to meet specified requirements.
2. Supplier's required environmental conditions are continually maintained.
3. Surfaces of products exposed to the elements are not adversely affected.

L. Replace any stored item damaged by inadequate protection or environmental controls.

M. Payment may be withheld for any products not properly stored.

1.16 CLEANING DURING CONSTRUCTION

A. Provide positive methods to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from disbursing into the atmosphere. Control dust and dirt from demolition, cutting, and patching operations.

B. Clean the Project as Work progresses and dispose of waste materials, keeping the Site free from accumulations of waste or rubbish. Provide containers on Site for waste collection. Do not allow waste materials or debris to blow around or off of the Site. Control dust from waste materials. Transport waste materials with as few handlings as possible.

C. Comply with codes, ordinances, regulations, and anti-pollution laws. Do not burn or bury waste materials. Remove waste materials, rubbish and debris from the Site and legally dispose of these at public or private dumping areas.

1.17 MAINTENANCE OF ROADS, DRIVEWAYS, AND ACCESS

A. Maintain roads and streets in a manner that is suitable for safe operations of public vehicle during all phases of construction unless the Owner approves a street closing. Submit a written request for Owner's approval of a street closing. The request shall state:

1. The reason for closing the street.
2. How long the street will remain closed.
3. Procedures to be taken to maintain the flow of traffic.
4. Do not close public roads overnight.

B. Construct temporary detours, including by-pass roads around construction, with adequately clear width to maintain the free flow of traffic at all times. Maintain barricades, signs, and safety features around the detour and excavations.

C. Maintain barricades, signs, and safety features around the Work in accordance with all provisions of the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).

D. Assume responsibility for any damage resulting from construction along roads or drives.

1.18 BLASTING

A. Blasting is not allowed for any purpose.

1.19 ARCHAEOLOGICAL REQUIREMENTS

A. Cease operations immediately and contact the Owner for instructions if an historical or archaeological find is made during construction.

B. Conduct all construction activities to avoid adverse impact on the Sites where significant historical or archaeological Sites have been identified at the Site.

1. Obtain details for Working in these areas.
2. Maintain confidentiality regarding the Site.
3. Adhere to the requirements of the Louisiana Division of Archaeology and any applicable local, state and federal laws.
4. Notify the Owner and the Louisiana Division of Archaeology

C. Do not disturb Archaeological Sites.

1. Obtain the services of a qualified archaeological specialist to instruct construction personnel on how to identify and protect archaeological finds on an emergency basis.
2. Coordinate activities to permit Archaeological Work to take place within the area.
    a. Attempt to archaeologically clear areas needed for construction as soon as possible.
    b. Provide a determination of priority for such areas.

D. Assume responsibility for any unauthorized destruction that might result to such Sites by construction personnel, and pay all penalties assessed by the State or Federal agencies for non-compliance with these requirements.

E. Contract time will be modified to compensate for delays caused by such archaeological finds. No additional compensation shall be paid for delays.

1.20 CUTTING AND PATCHING

A. Perform cutting, fitting, and patching required to complete the Work or to:

1. Uncover Work to provide for installation of new Work or the correction of defective Work.
2. Provide routine penetrations of non-structural surfaces for installation of mechanical, electrical, and plumbing Work.
3. Uncover Work that has been covered prior to observation by the Engineer.

B. Submit written notification to the Engineer in advance of performing any cutting which affects:

1. Work of any other Contractor or the Owner.
2. Structural integrity of any structure or system of the project.
3. Integrity or effectiveness of weather exposed or moisture resistant structure or systems.
4. Efficiency, operational life, maintenance, or safety of any structure or system.
5. Appearance of any structure or surfaces exposed occasionally or constantly to view.

C. The notification shall include:

1. Identification of the Project.
2. Location and description of affected Work.
3. Reason for cutting, alteration, or excavation.
4. Effect on the Work of any separate contractor or Owner.
5. Effect on the structural or weatherproof integrity of the project.
6. Description of proposed Work, including:
    a. Scope of cutting, patching, or alteration.
    b. Trades that will perform the Work.
    c. Products proposed for use.
    d. Extent of refinishing to be performed.
    e. Cost proposal, when applicable.
7. Alternatives to cutting and patching.
8. Written authorization from any separate Contractor whose Work would be affected.
9. Date and time Work will be uncovered or altered.

D. Examine the existing conditions, including structures subject to damage or to movement during cutting or patching.

1. Inspect conditions affecting installation of products or performance of the Work after uncovering the Work.
2. Provide a written report of unacceptable or questionable conditions to the Engineer. The Contractor shall not proceed with Work until Engineer has provided further

instructions. Beginning Work will constitute acceptance of existing conditions by the Contractor.

E. Protect the structure and other parts of the Work and provide adequate support to maintain the structural integrity of the affected portions of the Work. Provide devices and methods to protect adjacent Work and other portions of the Project from damage. Provide protection from the weather for portions of the Project that may be exposed by cutting and patching Work.

F. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs.

G. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

H. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to, the removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the modified Work.

I. Restore Work which has been cut or removed. Install new products to provide completed Work per the Contract Documents.

J. Fit Work air-tight to pipes, sleeves, ducts, conduit, and other penetrations through the surfaces. Where fire rated separations are penetrated, fill the space around the pipe or insert with materials with physical characteristics equivalent to fire resistance requirements of penetrated surface.

K. Patch finished surfaces and building components using new products specified for the original installation.

L. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to the nearest intersection.

2. For an assembly, refinish the entire unit.

1.21 PRELIMINARY OCCUPANCY

A. Owner may deliver, install and connect equipment, furnishings, or other apparatus in buildings or other structures. These actions do not indicate acceptance of any part of the building or structure and does not affect the start of warranties or correction periods.

B. Protect the Owner's property after installation is complete.

C. Owner or Engineer may use any product for testing or determine that the product meets the requirements of the Contract Documents. This use does not constitute acceptance by either the Owner or Engineer. These actions do not indicate acceptance of any part of the product and does not affect the start of warranties or correction periods.

1.22 INITIAL MAINTENANCE AND OPERATION

A. Maintain equipment until the Project is accepted by the Owner. Ensure that mechanical equipment is properly maintained as recommended by the Supplier.

B. Do not operate air handling equipment unless filters are in place and are clean. Change filters weekly during construction.

C. Provide maintenance and start-up services prior to acceptance of equipment, per Section 01 75 00 “Starting and Adjusting.”

D. Remove and clean screens and strainers in piping systems.

E. Clean insects from intake louver screens.

F. Provide documentation of maintenance and operations when Owner takes over operation and control of the Project.

1.23 ENDANGERED SPECIES RESOURCES

A. No activity is authorized that is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the Federal Endangered Species Act (ESA), and/or Title 56 of the Louisiana Revised Statues or to destroy or adversely modify the habitat of such species.

B. If a threatened or endangered species is encountered during construction, the Contractor shall immediately cease Work in the area of the encounter and notify the Owner, who will immediately implement actions in accordance with the ESA and applicable local, state and federal laws. These actions shall include reporting the encounter to the U. S. Fish and Wildlife Service and the Louisiana Parks and Wildlife Department, obtaining any necessary approvals or permits to enable the Work to continue, or implement other mitigative actions. The Contractor shall not resume construction in the area of the encounter until authorized to do so by the Owner.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials in accordance with the requirements of the individual Sections.

3.00 EXECUTION

3.01 PERFORMANCE OF WORK

A. Perform the Work per the Supplier’s published instructions. Do not omit any preparatory step or installation procedure unless specifically exempted or modified by Field Order.

END OF SECTION

01 31 13 PROJECT COORDINATION

1.00 GENERAL

1.01 WORK INCLUDED

A. Administer contract requirements to construct the Project. Provide documentation per the requirements of this Section. Provide information as requested by the Engineer or Owner.

1.02 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00 “Document Management.”

1.03 COMMUNICATION DURING THE PROJECT

A. The Engineer is to be the first point of contact for all parties on matters concerning this project.

B. The Engineer will coordinate correspondence concerning:

1. Submittals, including Applications for Payment.
2. Clarification and interpretation of the Contract Documents.
3. Contract modifications.
4. Observation of Work and testing.
5. Claims.

C. The Engineer will normally communicate only with the Contractor. Any required communication with Subcontractors or Suppliers will only be with the direct involvement of the Contractor.

D. Direct written communications to the Engineer at the address indicated at the Pre-construction Conference. Include the following with communications as a minimum:

1. Name of the Owner.
2. Project name.
3. Contract title.
4. Project number.
5. Date.
6. A reference statement.

E. Submit communications on the forms referenced in this Section or in Section 01 33 00 “Submittal Procedures.”

1.04 PROJECT MEETINGS

A. Pre-construction Conference:

1. Attend a pre-construction conference.
2. The location of the conference will be determined by the Engineer.

3. The time of the meeting will be determined by the Engineer but will be after the Notice of Award is issued and not later than 15 days after the Notice to Proceed is issued.
4. The Owner, Engineer, Contractor's project manager and superintendent, representatives of utility companies, and representatives from major Subcontractors and Suppliers may attend the conference.
5. Provide and be prepared to discuss:
    a. Preliminary construction schedule per Section 01 32 16 "Construction Progress Schedule."
    b. Preliminary submittal schedule per Section 01 33 00 "Document Management."
    c. Schedule of values and anticipated schedule of payments per Section 01 29 00 "Payment Procedures."
    d. List of Subcontractors and Suppliers.
    e. Contractor's organizational chart as it relates to this Project.
    f. Letter indicating the agents of authority for the Contractor and the limit of that authority with respect to the execution of legal documents, contract modifications and payment requests.
6. Letter indicating the agents of authority for the Contractor and the limit of that authority with respect to the execution of legal documents, contract modifications and payment requests.

B. Progress Meetings:
1. Attend meetings with the Engineer and Owner.
    a. Meet on a monthly basis or as requested by the Engineer to discuss the Project.
    b. Meet at the Site or other location as designated by the Engineer.
    c. Contractor's superintendent and other key personnel are to attend the meeting. Other individuals may be requested to attend to discuss specific matters.
    d. Notify the Engineer of any specific items to be discussed a minimum of 1 week prior to the meeting.
2. Provide information as requested by the Engineer or Owner concerning this Project. Prepare to discuss:
    a. Status of overall project schedule.
    b. Contractor's detailed schedule for the next month.
    c. Anticipated delivery dates for equipment.
    d. Coordination with the Owner.
    e. Status of submittals.
    f. Information or clarification of the Contract Documents.
    g. Claims and proposed modifications to the Contract.
    h. Field observations, problems, or conflicts.

i. Maintenance of quality standards.

3. Engineer will prepare minutes of meetings. Review the minutes of the meeting and notify the Engineer of any discrepancies within ten days of the date of the meeting memorandum. The minutes will not be corrected after the ten days have expired. Corrections will be reflected in the minutes of the following meeting or as an attachment to the minutes.

C. Pre-submittal and Pre-installation Meetings:

1. Conduct pre-submittal and pre-installation meetings as required in the individual technical Specifications or as determined necessary by the Engineer (for example, instrumentation, roofing, concrete mix design, etc.).

2. Set the time and location of the meetings when ready to proceed with the associated Work. Submit a Notification by Contractor in accordance with Paragraph 1.07 for the meeting 2 weeks before the meeting. Engineer and Owner must approve of the proposed time and location.

3. Attend the meeting and require the participation of appropriate Subcontractors and Suppliers in the meeting.

4. Prepare minutes of the meeting and submit to the Engineer and Owner for review. Owner and Engineer will review the minutes of the meeting and notify the Contractor of any discrepancies within ten days of the date of the meeting memorandum. The minutes will not be corrected after the ten days have expired. Corrections will be reflected in a revised set of meeting minutes.

1.05 REQUESTS FOR INFORMATION

A. Submit Request for Information (RFI) to the Engineer to obtain additional information or clarification of the Contract Documents.

1. Submit a separate RFI for each item on the form provided by the Engineer.

2. Attach adequate information to permit a written response without further clarification. Engineer will return requests that do not have adequate information to the Contractor for additional information. Contractor is responsible for all delays resulting from multiple submittals due to inadequate information.

3. A response will be made when adequate information is provided. Response will be made on the RFI form or in attached information.

B. Response to an RFI is given to provide additional information, interpretation, or clarification of the requirements of the Contract Documents, and does not modify the Contract Documents.

C. Engineer will initiate a Contract Modification Request per Paragraph 1.08 if the RFI indicates that a contract modification is required.

D. Use the Project Issues Log to document decisions made at meetings and actions to be taken in Accordance with Paragraph 1.06.

1.06 PROJECT ISSUES LOG

A. Engineer will maintain a project issues log to document key decisions made at meeting and track action on these issues:

1. Review the log prior to each regular meeting.

2. Report actions taken subsequent to the previous progress meeting on items in the log assigned to the Contractor or through the Contractor to a Subcontractor or Supplier to the Engineer. Report on status of progress 1 week prior to each progress meeting established in Paragraph 1.04 to allow Engineer to update the log prior to the Progress meetings.

3. Be prepared to discuss the status at each meeting.

B. Decisions or action items in the log that require a change in the Contract Documents will have the preparation of a contract modification as an action items if appropriate. The Contract Documents can only be changed by a Change Order or Field Order.

1.07 NOTIFICATION BY CONTRACTOR

A. Notify the Engineer of:

1. Need for testing.

2. Intent to work outside regular working hours.

3. Request to shut down facilities or utilities.

4. Proposed utility connections.

5. Required observation by Engineer or inspection agencies prior to covering Work.

6. Training.

B. Provide notification a minimum of 2 weeks in advance in order to allow Owner and Engineer time to respond appropriately to the notification.

C. Use “Notification by Contractor” form provided by the Engineer.

1.08 REQUESTS FOR MODIFICATIONS

A. Submit a request to the Engineer for any change in the Contract Documents.

1. Use the “Contract Modification Request” (CMR) form provided by the Engineer.

2. Assign a number to the Contract Modification Request when issued.

3. Include with the Contract Modification Request:

a. A complete description of the proposed modification.

b. The reason the modification is requested.

c. A detailed breakdown of the cost of the change (necessary only if the modification requires a change in contract amount). The itemized breakdown is to include:

1). List of materials and equipment to be installed.

2). Man hours for labor by classification.

3). Equipment used in construction.

4). Consumable supplies, fuels, and materials.

5). Royalties and patent fees.

6). Bonds and insurance.

7). Overhead and profit.

8). Field office costs.

9). Home office cost.

10). Other items of cost.

d. Provide the level of detail outline in the paragraph above for each Subcontractor or Supplier actually performing the Work if Work is to be provided by a Subcontractor or Supplier. Indicate appropriate Contractor mark-ups for Work provided through Subcontractors and Suppliers. Provide the level of detail outline in the paragraph above for self-performed Work.

e. Provide a revised schedule indicating the effect on the critical path for the Project and a statement of the number of days the Project may be delayed by the modification.

4. Submit a Contract Modification Request to the Engineer to request a field change.

5. A Contract Modification Request is required for all substitutions or deviations from the Contract Documents.

6. Engineer will evaluate the request for a contract modification.

B. Owner will initiate changes through the Engineer.

1. Engineer will prepare a description of proposed modifications to the Contract Documents.

2. Engineer will use the Contract Modification Request form. Engineer will assign a number to the Contract Modification Request when issued.

3. Return the Contract Modification Request with a proposal to incorporate the requested change. Include a breakdown of costs into materials and labor in detail outline above to allow evaluation by the Engineer.

C. Engineer will issue a Field Order or a Change Order per the General Conditions if a contract modification is appropriate.

1. Modifications to the contract can only be made by a Field Order or a Change Order.

2. Changes in the Project will be documented by a Field Order or by a Change Order.

3. Field Orders may be issued by the Engineer for contract modifications that do not change the Contract Price or Contract Time.

4. Any modifications that require a change in Contract Price or Contract Time can only be approved by Change Order.

a. Proposals issued by the Contractor in response to a Contract Modification Request will be evaluated by the Engineer.

b. If a Change Order is recommended, the Engineer will prepare the Change Order.

c. The Change Order will be sent to the Contractor for execution with a copy to the Owner recommending approval.

d. Change Orders can only be approved by the Owner.

1). Work performed on the proposed contract modifications prior to the approval of the Change Order will be performed at the Contractor's risk.

2). No payment will be made for Work on Change Orders until approved by the Owner.

D. The Contractor may be informed that the Contract Modification Request is not approved and construction is to proceed in accordance with the Contract Documents.

1.09 RECORD DRAWINGS

A. Maintain at the site one complete record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Contract modifications.
5. Approved Shop Drawings and record data.
6. One set of construction photographs.
7. Test records.
8. Clarifications and other information provided in Request for Information responses.
9. Reference standards.

B. Store documents and Samples in the Contractor's field office.

1. Documents are to remain separate from documents used for construction. Do not use these documents for construction.
2. Provide files and racks for the storage of documents.
3. Provide a secure storage space for the storage of Samples.
4. Maintain documents in clean, dry, legible conditions, and in good order.
5. Make documents and Samples available at all times for inspection by the Engineer and Owner.

C. Marking Drawings:

1. Label each document as "Project Record" in large printed letters.
2. Record information as construction is being performed.

a. Do not conceal any Work until the required information is recorded.

b. Mark Drawings to record actual construction, including the following:

1). Depths of various elements of the foundation in relation to finished first floor datum or the top of walls.

2). Horizontal and vertical locations of underground utilities and appurtenances constructed and existing utilities encountered during construction.

3). Location of internal utilities and appurtenances concealed in the construction. Refer measurements to permanent structure on the surface. Include the following equipment:

a). Piping.

b). Ductwork.

c). Equipment and control devices requiring periodic maintenance or repair.

d). Valves, unions, traps, and tanks.

e). Services entrance.

f). Feeders.

g). Outlets.

4). Changes of dimension and detail.

5). Changes made by Field Order and Change Order.

6). Details not on the original Drawings. Include field verified dimensions and clarifications, interpretations, and additional information issued in response to RFIs.

c. Mark Specifications and Addenda to identify products provided.

1). Record product name, trade name, catalog number, and each Supplier (with address and phone number) of each product and item of equipment actually installed.

2). Record changes made by Field Order and Change Order.

d. Mark additional Work or information in erasable pencil.

1). Use red for new or revised indication.

2). Use purple for Work deleted or not installed (lines to be removed).

3). Highlight items constructed per the Contract Documents in yellow.

e. Submit record documents to Engineer for review and acceptance 30 days prior to final completion of the Project.

1). Provide one set of marked up Drawings.

2). Provide six sets of Specifications.

D. Applications for Payment will not be recommended for payment if record documents are found to be incomplete or not in order. Final payment will not be recommended without complete record documents.

2.00 PRODUCTS (NOT APPLICABLE)

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 31 13.13 FORMS

1.00 GENERAL

1.01 PROJECT FORMS

A. Use the forms provided by the Engineer for contract administration, applications for payment, submittals, documentation of test results, equipment installation and documentation, and project closeout.

B. A digital copy of the required forms including those listed below will be provided to the Contractor before or at the pre-construction conference.

1. Contract Administration Forms:
    a. Request for Information.
    b. Notification by Contractor.
    c. Contract Modification Request.
2. Payment Request Forms:
    a. Consent of Surety Company to Payment Procedures.
    b. Payment Request.
3. Submittal Forms:
    a. Submittal Transmittal.
    b. Shop Drawing Deviation Request.
4. Project Closeout Forms:
    a. Consent of Surety Company to Final Payment.
    b. Consent of Surety Company to Reduction of or Partial Release of Retainage.
    c. Contractor’s Affidavit of Payment of Debts and Claims.
    d. Contractor’s Affidavit of Release of Liens.

2.00 PRODUCTS (NOT APPLICABLE)

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 32 16 CONSTRUCTION PROGRESS SCHEDULE

1.00 GENERAL

1.01 REQUIREMENTS

A. Prepare and submit a Progress Schedule for the Work and update the schedule on a monthly basis for the duration of the Project.

B. Provide schedule in adequate detail to allow Owner to monitor the Work progress, to anticipate the time and amount of Applications for Payment, and to relate submittal processing to sequential activities of the Work.

C. Incorporate and specifically designate the dates of anticipated submission of submittals and the dates when submittals must be returned to the Contractor into the schedule.

D. Assume complete responsibility for maintaining the progress of the Work per the schedule submitted.

E. Take all requirements of Section 01 35 00 “Special Procedures” into consideration when preparing schedule.

1.02 SUBMITTALS

A. Submit Progress Schedules in accordance with Section 01 33 00 “Document Management.” Submit schedules within the following times:

1. Preliminary schedule within 10 days after the Notice of Award. The schedule is to be available at the pre-construction conference.

2. Detailed schedule at least 10 days prior to the first payment request.

B. Submit Progress Schedules with Applications for Payment. Schedules may be used to evaluate the Applications for Payment. Failure to submit the schedule may cause delay in the review and approval of Applications for Payment.

1.03 SCHEDULE REQUIREMENTS

A. Schedule is to be in adequate detail to:

1. Assure adequate planning, scheduling, and reporting during the execution of the Work.

2. Assure the coordination of the Work of the Contractor and the various Subcontractors and Suppliers.

3. Assist in monitoring the progress of the Work.

4. Assist in evaluating proposed changes to Contract Time and project schedule.

5. Assist the Owner in review of Contractor’s Application for Payment.

B. Provide personnel with 5 years’ minimum experience in scheduling construction work comparable to this Project.

C. Provide the schedule in the form of a time scaled horizontal bar chart which indicates graphically the Work scheduled at any time during the Project. The graph is to indicate:

1. Complete sequence of construction by activity.
2. Identification of the activity by structure, location, and type of Work.
3. Chronological order of the start of each item of Work.
4. The activity start and stop dates.
5. The activity duration.
6. Successor and predecessor relationships for each activity. Group related activities or use lines to indicate relationships.
7. A clearly indicated critical path. Indicate only one critical path on the schedule. The subsystem with the longest time of completion is the critical path where several subsystems each have a critical path. Float time is to be assigned to other subsystems.
8. Project percentage of completion, based on dollar value of the Work included in each activity to the last day of the pay period for each Application for Payment.

D. Submit a separate submittal schedule indicating the dates when the submittals are to be sent to the Engineer.
   1. List specific dates submittal is to be sent to the Engineer.
   2. List specific dates submittal must be processed in order to meet the proposed schedule.
   3. Allow a reasonable time to review submittals, taking into consideration the size and complexity of the submittal, the submission of other submittals, and other factors that may affect review time.
   4. Allow time for re-submission of the submittals for each item. Contractor is responsible for delays associated with additional time required to review incomplete or erroneous submittals and for the time lost when submittals are submitted for products that do not meet specification requirements.

E. Update the schedule at the end of each monthly partial payment period to indicate the progress made on the Project to that date.

1.04 SCHEDULE REVISIONS

A. Submit a written report if the schedule indicates that the Project is more than 30 days behind schedule. The report is to include:
   1. Number of days Project is behind schedule.
   2. Narrative description of the steps to be taken to bring the Project back on schedule.
   3. Anticipated time required to bring the Project back on schedule.
   4. Submit a revised schedule indicating the action that the Contractor proposes to take to bring the Project back on schedule.

B. Revise the schedule to indicate any adjustments in Contract Time approved by Change Order.
   1. Revised schedule is to be included with Contract Modification Request for which an extension of time is requested.

2. Failure to submit a revised schedule indicates that the modification shall have no impact on the ability of the Contractor to complete the Project on time and that the cost associated with the change of additional plant or work force have been included in the cost proposed for the modification.

C. Updating the project schedule to reflect actual progress is not considered a revision to the project schedule.

D. Applications for Payment will not be recommended for payment without a revised schedule and if required, the report indicating the Contractor's plan for bringing the Project back on schedule.

1.05 FLOAT TIME

A. Define float time as the amount of time between the earliest start date and the latest start date of a chain of activities on the construction schedule.

B. Float time is not for the exclusive use or benefit of either the Contractor or Owner.

C. Contract time cannot be changed by the submission of this schedule. Contract Time can only be modified by approved Change Order.

D. Schedule completion date must be the same as the contract completion date. Time between the end of construction and the contract final completion date is to be indicated as float time.

2.00 PRODUCTS (NOT APPLICABLE)

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 32 33 PHOTOGRAPHIC DOCUMENTATION

1.00 GENERAL

1.01 WORK INCLUDED

A. All photographs provided under this section and digital copies of these photographs are to become the property of the Owner. Photographs may not be used for publication, or public or private display without the written consent of the Owner.

B. Cost of Photographic Documentation is to be included in the Contractor Construction Phase fee.

C. Provide photographs prior to the beginning of construction and throughout the duration of construction. Progress photos shall be submitted with each pay application.

1.02 QUALITY ASSURANCE

A. Provide clear photographs taken with proper exposure. View photographs in the field and take new photographs immediately if photos of an adequate print quality cannot be produced. Provide photographs with adequate quality and resolution to permit enlargements.

1.03 SUBMITTALS

A. Submit photographic documentation as record data in accordance with Section 01 33 00 “Submittal Procedures.”

2.00 PRODUCTS

2.01 PHOTOGRAPHS

A. Provide photographs in digital format with a minimum resolution of 1280 x 960, accomplished without a digital zoom.

B. Take photographs at locations acceptable to the Engineer.

C. Provide digital copy of each photograph taken.

D. Identify each print on PDF with:

1. Project name.
2. Date, time, location, and orientation of the exposure.
3. Description of the subject of photograph.

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 33 00 DOCUMENT MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Submit documentation as required by the Contract Documents and as requested by the Construction Manager.

B. Use the Project Management Information System (PMIS) provided by the Construction Manager. Software for the PMIS is FNiManager which has the following system requirements:

1. Operating Systems: Windows 7 or later and OS X v10.8 or later.

2. Supported Internet Browsers: Internet Explorer 11.0 or later, Google Chrome 70.0 or later, Firefox 63.0 or later, Safari 11.0 or later, and Microsoft Edge 17.0 or later.

3. Screen Resolution: The recommended screen resolution is 1280 x 1024 or higher. The minimum screen resolution required to support all features is 1024 x 768.

1.02 QUALITY ASSURANCE

A. Submit legible, accurate, complete documents presented in a clear, easily understood manner. Documents not meeting these criteria will be returned without review as “Not Approved.”

1.03 CONTRACTOR’S RESPONSIBILITIES

A. Review documents prior to submission. Make certifications as required by the Contract Documents and as indicated on Construction Manager provided forms.

B. Provide a Schedule of Documents to list the documents that are to be submitted and the dates on which documents are to be sent to the Construction Manager for review. Use the form provided by the Construction Manager for this list.

C. Incorporate the dates for processing documents into the Progress Schedule required by Section 01 33 05 “Construction Progress Schedule.”

1. Provide documents in accordance with the schedule so construction of the Project is not delayed.

2. Allow a reasonable time for the review of documents when preparing the Progress Schedule. Assume a 14-day review cycle for each document unless a longer period of time is indicated in the Contract Documents or agreed to by Construction Manager and Contractor.

3. Schedule delivery of review documents to provide all information for interrelated Work at one time.

4. Allow adequate time for processing documents so construction of the Project is not delayed.

1.04 FORMS AND WORKFLOWS

A. Use the forms or workflow process provided by the Construction Manager for project documentation.

1.05 DOCUMENT PREPARATION AND DELIVERY PROCEDURES

A. Deliver documents in electronic format as directed by the Construction Manager.

1. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

2. Deliver all documents in Portable Document Format (PDF).

a. Create PDF document using Bluebeam Revu software.

b. Create PDF documents from native format files unless files are only available from scanned documents.

c. Rotate pages so that the top of each document appears at the top of the monitor screen when opened in PDF viewing software.

d. Provide PDF document with adequate resolution to allow documents to be printed in a format equivalent to the document original. Documents are to be scalable to allow printing on standard 8-1/2 x 11 or 11 x 17 paper.

e. Submit color PDF documents where color is required to interpret the document.

f. Create or convert documents to allow text to be selected for comments or searched using text search features. Run scanned documents through Optical Character Recognition (OCR) software if necessary.

g. Flatten markups in documents to prevent markups made by Contractor from being moved or deleted. Flatten documents to allow markup recovery.

h. Use Bluebeam Revu software to reduce file size using default settings except the option for “Drop Metadata”. Uncheck the “Drop Metadata” box when reducing file size.

i. Add footers to each document with the name of the Project.

1.06 DOCUMENT NUMBERING

A. Assign a document number to the Contractor originated document to allow tracking of the document during the review process.

1. Assign the number consisting of a prefix, a sequence number, and a letter suffix. Prefixes will be as follows:

Prefix	Description
AP	Application for Payment
CP	Change Proposal
CTR	Certified Test Report
EIR	Equipment Installation Report
GD	Graphic Documentation

Prefix	Description
NBC	Notification by Contractor
O&M	Operation and Maintenance Manuals
PD	Product Data
RD	Record Data
RFI	Request for Information
SD	Shop Drawing
SCH	Schedule of Progress

2. Issue sequence numbers in chronological order for each type of document as directed by the Construction Manager.

3. Issue numbers for resubmittals that have the same number as the original document followed by an alphabetical suffix indicating the number of times the same document has been sent to the Construction Manager for processing. For example: SD-025 A represents Shop Drawing number 25 and the letter "A" designates this is the second time this document has been sent for review.

4. Clearly note the document number on each page or sheet of the document.

5. Correct assignment of numbers is essential since different document types are processed in different ways.

B. Include reference to the Drawing number and/or Specification Section, detail designation, schedule, or location that corresponds with the data submitted on the Document Transmittal form. Other identification may also be required, such as layout drawings or schedules to allow the reviewer to determine where a particular product is to be used.

1.07 DOCUMENTATION

A. Furnish documents as indicated in the individual Specification Sections. Submit documents per the procedures described in the Contract Documents.

B. Submit documents per the Specification Sections shown in the following table:

Document Type	Specification Section
Application for Payment	01 29 00
Certified Test Report	01 33 02 for approval of product 01 40 00 to demonstrate compliance
Change Management	01 26 00
Equipment Installation Report	01 75 00
Graphic Documentation	01 33 06
Notification by Contractor	01 31 13
Operation & Maintenance Manuals	01 33 04
Product Data	01 33 03
Progress Schedules	01 33 05
Record Data	01 31 13
Request for Information	01 31 13
Schedule of Values	01 29 00
Shop Drawings	01 33 02

Document Type	Specification Section
Substitutions	01 26 00
Suppliers and Subcontractors	01 31 13 01 33 03

1.08 Electronic Documents Protocol

A. The parties shall follow the provisions in this Section, referred to as the Electronic Documents Protocol ("EDP"), for exchange of electronic transmittals.

B. Basic Requirements:

1. Except as otherwise stated elsewhere in the Contract Documents, the OPT and Contractor will send and accept Electronic Documents sent by Electronic Means using the protocols provided in this Section.

2. The contents of the information in any Electronic Document will be the responsibility of the transmitting party. Electronic Documents may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, and are subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

3. Provisions of this Contract regarding Electronic Documents must be incorporated into other agreements or subcontracts on the Project. Nothing in this paragraph reduces or eliminates requirements:

a. to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations;

b. to comply with any applicable Law or Regulation governing the signing and sealing of design documents and related Modifications or the signing and electronic transmission of any other documents; or

c. to comply with the notice requirements.

4. When sending Electronic Documents by Electronic Means the sending party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or sending Electronic Documents.

C. System Infrastructure for Electronic Document Exchange:

1. Contractor will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost. System Infrastructure must comply with these requirements.

2. The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 100 MB. Attachments larger than that may be exchanged in parts or by using large file transfer functions or physical media.

3. Contractor assumes full and complete responsibility for its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software.

4. Contractor is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

5. Contractor will operate and maintain industry-standard, industry-accepted, ISO standard, commercial-grade security software and systems that are intended to protect others from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. Contractor will not be liable to others for any breach of system security to the extent that Contractor maintains and operates required security software and systems.

6. In the case of disputes, conflicts, or modifications to the use of Electronic Documents required to address issues affecting System Infrastructure, Contractor and OPT will cooperatively resolve the issues; but, failing resolution, OPT is authorized to make and require reasonable and necessary changes meet its original intent. Contractor may submit a Change Proposal if the changes cause additional cost or time to Contractor that could not have reasonably been anticipated.

7. Contractor and OPT are both responsible for their own back-up and archive of documents sent and received during the term of the contract. Contractor and OPT remain solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract as each party deems necessary for its own purposes.

8. If a Contractor or OPT receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

9. OPT will operate a project information management system (Project Website) for use of OPT and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this Contract, use of the Project Website will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information.

D. Software Requirements:

1. OPT and Contractor will each acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic

Documents received from the other party (and if relevant from third parties), using the following software formats:

Document	Document Format
Email	.htm, .rtf, or .txt without formatting that impair legibility of content on screen or in printed copies
Submittals	Bluebeam PDF
Applications for Payment	Bluebeam PDF and Microsoft® Excel
Progress Schedules	PDF and Schedule in Schedule in Native Format
Layouts and drawings to be submitted to Owner for future use and modification	Autodesk® AutoCAD .dwg format
Document submitted to OPT for future word processing use and modification	Microsoft® Word
Spreadsheets and data submitted to OPT for future data processing use and modification	Microsoft® Excel
Photographs	.jpg or .jpeg
Videos	.mp4, .mpeg, or .avi

2. Software will be the version currently published at the time Contract is signed, unless a specific software version is listed in the Supplementary Conditions. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or convert to comply with this Section.

3. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

E. Requests by Contractor for Electronic Documents in Other Formats:

1. Release of any Electronic Documents developed during the design process (including Contract Documents, Technical Data, Drawings, and computer models) in formats other than those identified in this Section will be at the discretion of the OPT.

2. To the extent determined by OPT, release of Electronic Documents and other project information requested by Contractor ("Request") in formats other than those identified in this Section will be subject to the provisions of Owner's response to the Request, and to the following conditions:

a. The content included in the Electronic Documents covered by the Request was prepared by Design Professional as an internal working document or electronic computer model solely for Design Professional's purposes and not for any construction processes and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, any implied warranties of fitness

for any purpose. Contractor is advised and acknowledges that the content may not be suitable for Contractor's application or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Design Professional to Contractor under the Request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and Contractor waives any claims against the Design Professional or Owner arising from use of data in Electronic Documents covered by the Request.

c. **CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND DESIGN PROFESSIONAL AND THEIR SUBCONSULTANTS FROM ALL CLAIMS, DAMAGES, LOSSES, AND EXPENSES, INCLUDING ATTORNEYS' FEES AND DEFENSE COSTS ARISING OUT OF OR RESULTING FROM THE CONTRACTOR'S USE, ADAPTATION, OR DISTRIBUTION OF ANY ELECTRONIC DOCUMENTS PROVIDED UNDER THE REQUEST.**

d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Design Professional, unless such distribution is specifically identified in the Request and is limited to the Contractor's subcontractors. Contractor warrants that subsequent use by the Contractor's subcontractors complies with all terms of the Contract Documents and the Owner's response to Request.

3. In the event that Owner elects to provide or directs Design Professional to provide to Contractor any Contractor-requested Electronic Document versions of project information that is not explicitly identified in the Contract Documents as being available to Contractor, Owner shall be reimbursed by Contractor on an hourly basis for any costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Design Professional in accordance with the General Conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 33 02 SHOP DRAWINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Shop Drawings are required for those products that cannot adequately be described in the Contract Documents to allow fabrication, erection, or installation of the product without additional detailed information from the Supplier.

B. Submit Shop Drawings as required by the Contract Documents and as reasonably requested by the Construction Manager to:

1. Record the products incorporated into the Project;

2. Provide detailed information for the products proposed for the Project regarding their fabrication, installation, commissioning, and testing; and

3. Allow the Design Professional to advise the Owner if products proposed for the Project by the Contractor conform, in general, to the design concepts of the Contract Documents.

C. Contractor's responsibility for full compliance with the Contract Documents is not relieved by the review of Shop Drawings, Samples, or mockups.

D. Submit a Change Proposal per Section 01 26 00 "Change Management" to request modifications to the Contract Documents, including those for approval of "or equal" products when specifically allowed by the Contract Documents or as a substitution for specified products or procedures. Deviations from the Contract Documents can only be approved Change Order or Field Order.

1.02 QUALITY ASSURANCE

A. Submit legible, accurate, and complete documents presented in a clear, easily understood manner. Shop Drawings not meeting these criteria will not be approved.

B. Demonstrate that the proposed products are in full compliance with the design criteria and requirements of the Contract Documents, or will be if deviations requested per Paragraph 1.09 are approved.

C. Furnish and install products that fully comply with the information included in the Shop Drawings.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Furnish Shop Drawings for products as indicated in the individual Specification Sections.

B. Include Shop Drawings in the Document Register required by Section 01 33 00 "Document Management" to indicate the Shop Drawings to be submitted, the dates on which Shop Drawings are to be sent to the Construction Manager for review, and proposed dates that the product will be incorporated into the Project.

C. Incorporate the dates for processing Shop Drawings into the Progress Schedule required by Section 01 33 05 "Construction Progress Schedule."

1. Submit Shop Drawings in accordance with the schedule so construction of the Project is not delayed.
2. Submit Shop Drawings for interrelated Work at one time.
3. Allow adequate time for ordering, fabricating, delivering, and installing products so construction of the Project is not delayed.

D. Complete the following before submitting a Shop Drawing or Sample:

1. Prepare and review the Shop Drawing or Sample. Coordinate the Shop Drawing or Sample with other Shop Drawings and Samples, with the requirements of the Work, and the Contract Documents;
2. Determine and verify specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to Shop Drawings and Samples;
3. Determine and verify the suitability of materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
4. Determine and verify information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

E. Determine and verify:

1. Field measurements, quantities, and dimensions are shown on the Shop Drawing and are accurate;
2. Location of existing structures, utilities, and equipment related to the Shop Drawing have been shown and conflicts between the products, existing structures, utilities, and equipment have been identified;
3. Conflicts that impact the installation of the products have been brought to the attention of the Construction Manager;
4. Shop Drawing is complete for its intended purpose; and
5. Conflicts between the Shop Drawing related to the various Subcontractors and Suppliers have been resolved.

F. Review Shop Drawings prior to submitting to the Construction Manager. Certify that all Shop Drawings have been reviewed by the Contractor and are in strict conformance with the Contract Documents as modified by Addenda, Change Order, Field Order, or Contract Amendment when submitting Shop Drawings except for deviations specifically brought to the Construction Manager's attention on an attached Shop Drawing Deviation Request form in accordance with Paragraph 1.09.

G. Fabrication or installation of any products prior to the approval of Shop Drawings is done at the Contractor's risk. Defective products may be rejected at the Owner's option.

H. Payment will not be made for products for which Shop Drawings or Samples are required until these are approved by the Construction Manager and Design Professional.

1.04 DOCUMENTATION

A. Provide adequate information in Shop Drawings and with Samples so the Design Professional can:

1. Assist the Owner in selecting colors, textures, or other aesthetic features.

2. Compare the proposed features of the product with the specified features and advise Owner that the product does, in general, conform to the Contract Documents.

3. Compare the performance features of the proposed product with those specified and advise the Owner that the product does, in general, conform to the performance criteria specified in the Contract Documents.

4. Review required certifications, guarantees, warranties, and service agreements for compliance with the Contract Documents.

B. Include a complete description of the material or equipment to be furnished, including:

1. Type, dimensions, size, arrangement, model number, and operational parameters of the components;

2. Weights, gauges, materials of construction, external connections, anchors, and supports required;

3. Performance characteristics, capacities, engineering data, motor curves, and other information necessary to allow a complete evaluation of mechanical components;

4. All applicable standards;

5. Fabrication and installation drawings, setting diagrams, manufacturing instructions, templates, patterns, and coordination drawings;

6. Wiring and piping diagrams and related controls;

7. Mix designs for concrete, asphalt, or other materials proportioned for the Project; and

8. Complete and accurate field measurements for products which must fit existing conditions. Indicate on the document that the measurements represent actual dimensions obtained at the Site.

C. Submit Shop Drawings that require coordination with other Shop Drawings for fabrication at the same time. Shop Drawings requiring coordination with other Shop Drawings will not be approved until a complete package is submitted, unless approved by the Construction Manager.

D. Submit information for all of the components and related equipment required for a complete and operational system in one Submittal.

1. Include electrical, mechanical, and other information required to indicate how the various components of the system function together as a system.

2. Provide certifications, warranties, and written guarantees and service contracts with the document package for review when these are required.

1.05 SPECIAL CERTIFICATIONS AND REPORTS

A. Provide all required special certifications, reports, and other documentation with the Shop Drawings as specified in the individual Specification Sections which may include:

1. Certified Test Reports (CTR): A report prepared by an approved testing agency giving results of tests performed on products to indicate their compliance with the Specifications. This report is to demonstrate that the product, when installed, will meet the requirements of the Contract Documents and is part of the Shop Drawing. Field tests may be performed by the Owner to determine that in place materials or products meet the same quality as indicated in the CTR submitted as part of the Shop Drawing.

2. Certification of Local Field Service (CLS): A certified letter stating that field service is available from a factory or supplier approved service organization located within a 300-mile radius of the Site. Include the names, addresses, and telephone numbers of approved service organizations with the certificate.

3. Certification of Adequacy of Design (CAD): A certified letter from the manufacturer of the equipment stating that the equipment has been designed to be structurally stable and to withstand all imposed loads without deformation, failure, or adverse effects to the performance and operational requirements of the unit. The letter must state that mechanical and electrical components have been adequately sized to be fully operational for the conditions specified or normally encountered by the product's intended use.

4. Certification of Applicator/Subcontractor (CSQ): A certified letter stating that the applicator or subcontractor proposed to perform a specified function is duly designated as factory authorized and trained for the application of the specified product.

1.06 WARRANTIES AND SERVICE AGREEMENTS

A. Provide warranties and service agreements per Section 01 78 36 "Warranties and Service Agreements."

1.07 SHOP DRAWING SUBMITTAL PROCEDURES

A. Submit Shop Drawings to the Construction Manager. Send all documents in digital format for processing.

1. Provide all information requested. Do not leave any blanks incomplete. If information is not applicable, enter NA in the space provided.

2. Submit all documents in Portable Document Format (PDF) as required by Section 01 33 00 "Document Management." Provide color PDF documents where color is required to interpret the Shop Drawing. Provide Samples and color charts per Paragraph 1.08.

3. Submit each specific product, class of material, or equipment system separately so these can be tracked and processed independently. Do not submit Shop Drawings for more than one independent system in the same Submittal.

4. Submit items specified in different Specification Sections separately unless they are part of an integrated system.
5. Define abbreviations and symbols used in Shop Drawings.
    a. Use terms and symbols in Shop Drawings consistent with the Contract Drawings.
    b. Provide a list of abbreviations and their meaning as used in the Shop Drawings.
    c. Provide a legend for symbols used on Shop Drawings.
6. Mark Shop Drawings to reference:
    a. Related Specification Sections;
    b. Drawing number and detail designation;
    c. Equipment designation or name;
    d. Schedule references;
    e. System into which the product is incorporated; and
    f. Location where the product is incorporated into the Project.

B. Use the following conventions to markup Shop Drawings for review:
1. Make comments and corrections in the color blue. Add explanatory comments to the markup.
2. Highlight items in black (redact) that are not being furnished when the Supplier's standard drawings or information sheets are provided so that only the products to be provided are in their original color.
3. Make comments in yellow where selections or decisions by the Design Professional are required, but such selections do not constitute a deviation from the Contract Documents. Add explanatory comments to the markup to indicate the action requested of the Design Professional.
4. Make comments in orange that are deviation requests. Include the deviation request number on the Shop Drawing that corresponds to the deviation request on the Shop Drawing Deviation Request form. Include explanatory comments in the Shop Drawing Deviation Request form.
5. Mark dimensions with the prefix "FD" to indicate field verified dimensions on the Shop Drawings.

C. Designate a document as requiring priority treatment to place the review of the Shop Drawing ahead of other Shop Drawings previously delivered. Shop Drawings are typically reviewed in the order received, unless Contractor requests that a different priority be assigned. Priority Shop Drawings will be reviewed before other Shop Drawings already received but not yet reviewed. Use of this priority designation for Shop Drawings may delay the review of Shop Drawings previously submitted. Contractor is responsible for delays resulting from the use of the priority designation status on Shop Drawings.

D. Complete the certification required by Paragraph 1.03.G.

1.08 SAMPLE AND MOCKUP SUBMITTAL PROCEDURES

A. Submit color charts and Samples for every product requiring color, texture, or finish selection.

1. Submit color charts and Samples only after Shop Drawings for the products have been approved.

2. Deliver all color charts and Samples at one time.

3. Provide Samples of adequate size to clearly illustrate the functional characteristics of the product, with integrally related parts and attachment devices.

4. Indicate the full range of color, texture, and patterns.

5. Deliver color charts and Samples to the field office and store for the duration of the Project.

6. Notify the Construction Manager that color charts and Samples have been delivered for approval using the Notification by Contractor form.

7. Submit color charts and Samples not less than 30 days prior to when these products are to be ordered or released for fabrication to comply with the Project schedule.

8. Remove Samples that have not been approved. Submit new Samples following the same process as for the initial Sample until Samples are approved.

9. Dispose of Samples when related Work has been completed and approved and disposal is approved by the Construction Manager. At Owner's option, Samples will become the property of the Owner.

B. Construct mockups for comparison with the Work being performed.

1. Construct mockups from the actual products to be used in construction per the detailed specifications.

2. Construct mockups of the size and in the area indicated in the Contract Documents.

3. Construct mockups complete with texture and finish to represent the finished product.

4. Notify the Construction Manager that mockups have been constructed and are ready for approval using the Notification by Contractor form. Allow 2 weeks for Construction Manager to approve of the mockup before beginning the Work represented by the mockup.

5. Remove mockups that have not been approved. Construct new mockups following the same process as for the initial mockup until mockup is approved.

6. Protect mockups until Work has been completed and accepted by the Construction Manager.

7. Dispose of mockups when related Work has been completed and disposal is approved by the Construction Manager.

1.09 REQUESTS FOR DEVIATION

A. Submit a Change Proposal per Section 01 26 00 "Change Management" to request modifications to the Contract Documents, including those for approval of "or equal"

products when specifically allowed by the Contract Documents or as a substitution for specified products or procedures.

B. Provide a Shop Drawing with the Change Proposal that clearly identifies deviations for any product or component of the product that does not fully comply with the Contract Documents using the Shop Drawing Deviation Request form provided by the Construction Manager. Mark deviations on the Shop Drawing per Paragraph 1.07.B.

C. Include a description of why the deviation is required and the impact on Contract Price or Contract Times. Include the amount of any cost savings to the Owner for deviations that result in a reduction in cost.

D. Identify each deviation request as a separate item. Include all requested deviations that must be approved as a group together and identify them as a single item.

E. Construction Manager will issue a Field Order or Change Order to approve acceptable deviations. Approval of a requested Shop Drawing deviation by the Design Professional on the Shop Drawings Deviation Request form indicates approval of the requested deviation only on its technical merits as generally conforming to the Contract Documents. Deviations from the Contract Documents can only be approved by a Modification issued by the Construction Manager.

1.10 CONSTRUCTION MANAGER AND DESIGN PROFESSIONAL RESPONSIBILITIES

A. Shop Drawings will be received by the Construction Manager. Construction Manager will log the documents and forward to the Design Professional for review per this Section for general conformance with the Contract Documents.

1. Design Professional's review and approval will be only to determine if the products described in the Shop Drawing or Sample will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Design Professional's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Design Professional's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

B. Comments will be made on items called to the attention of the Design Professional for review and comment. Any marks made by the Design Professional do not constitute a blanket review of the document or relieve the Contractor from responsibility for errors or deviations from the Contract requirements.

1. Design Professional will respond to Contractor's markups by either making markups directly in the Shop Drawing file using the color red or by attaching a Document Review Comments form with review comments keyed to the Drawings or Shop Drawing Deviation Request.

2. Shop Drawings that are reviewed will be returned with one or more of the following status designations:

    a. Approved: Shop Drawing is found to be acceptable as submitted.

    b. Approved as Noted: Shop Drawing is approved so long as corrections or notations made by Design Professional are incorporated into the Shop Drawing.

    c. Not Approved: Shop Drawing or products described are not acceptable.

    d. Cancelled: This action indicates that for some reason, the Shop Drawing is to be removed from consideration and all efforts regarding the processing of that document are to cease.

3. Shop Drawings will also be designated for one of the following actions:

    a. Documents Filed: Shop Drawing is acceptable without further action and has been filed as a record document.

    b. Shop Drawing Not Required: A Shop Drawing was not required by the Contract Documents. Resubmit the document per Section 01 33 03 “Product Data.”

    c. Cancelled: This action indicates that for some reason, the Shop Drawing is to be removed from consideration and all efforts regarding the processing of that document are to cease.

    d. Revise and Resubmit: Shop Drawing has deviations from the Contract Documents, significant errors, or is inadequate and must be revised and resubmitted for subsequent review.

    Actions “a” through “c” will close out the Shop Drawing review process and no further action is required as a Shop Drawing. Action “d” requires follow up action to close out the review process.

4. Drawings with a significant or substantial number of markings by the Contractor may be marked “Approved as Noted.” These drawings are to be revised to provide a clean record of the document. Proceed with ordering products as the documents are revised.

5. Dimensions or other data that do not appear to conform to the Contract Documents will be marked as “At Variance With” (AVW) the Contract Documents or other information provided. The Contractor is to make revisions as appropriate to comply with the Contract Documents.

C. Bring deviations to the Shop Drawings to the attention of the Design Professional for approval by using the Shop Drawing Deviation Request form. Use a single line for each requested deviation so the Status and Action for each deviation can be determined for that requested deviation. If approval or rejection of a requested deviation will impact other requested deviation, then all related deviations should be included in that requested deviation line so the status and action can be determined on the requested deviation as a whole.

D. Requested deviations will be reviewed as a possible Modification to the Contract Documents.

1. A requested deviation will be marked as “Not Approved” if the requested deviation is unacceptable. Contractor is to revise and resubmit the Shop Drawing with corrections for approval.
2. A Field Order will be issued by the Construction Manager for deviations approved by the Design Professional if the requested deviation is acceptable and if the requested deviation will not result in a change in Contract Price or Contract Times. Requested deviations from the Contract Documents may only be approved by Field Order.
3. A requested deviation will not be approved if the requested deviation is acceptable but the requested deviation will or should result in a change in Contract Price or Contract Times. Submit any requested deviation that requires a change in Contract Price or Contract Times as a Change Proposal for approval prior to resubmitting the Shop Drawing.

E. Contractor is to resubmit a complete Shop Drawing incorporating revisions until it is acceptable and marked “Approved” or “Approved as Noted” and is assigned an action per Paragraph 1.10.B.3 that indicates that the Shop Drawing process is closed.

F. Information that is submitted as a Shop Drawing that should be submitted as Product Data or other type of document, or is not required may be returned without review, or may be deleted. No further action is required and the Shop Drawing process for this document will be closed.

1.11 RESUBMISSION REQUIREMENTS

A. Make all corrections or changes required by the Design Professional in the document and resubmit to the Construction Manager until approved.

B. Resubmit a complete Shop Drawing for each resubmittal. The last approved Shop Drawing must not rely on previous submissions. The final Shop Drawing is to provide a complete record for the Owner’s records.

C. Revise initial drawings or data and resubmit as specified for the reviewed document.

1. Highlight or cloud in green those revisions which have been made in response to the previous reviews by the Design Professional. This will include changes previously highlighted or clouded in yellow to direct attention to Design Professional to items requiring selections, decisions by the Design Professional or highlighted or clouded in orange for a requested deviation from the Contract Documents, or comments in red made by the Construction Manager.
2. Highlight and cloud new items in yellow where selections or decisions by the Design Professional are required, but such selections do not constitute a deviation from the Contract Documents. Add explanatory comments to the markup to indicate the action to be taken by the Design Professional.
3. Highlight and cloud new items in orange that are deviation requests. Include the deviation request number on the Shop Drawing that corresponds to the deviation request on the Shop Drawing Deviation Request form. Numbering for these new items is to start with the next number following the last Shop Drawing deviation requested. Include explanatory comments in the Shop Drawing Deviation Request form.

D. Pay for excessive review of Shop Drawings.

1. Excessive review of Shop Drawings is defined as any review required after the original review has been made and the first resubmittal has been checked to see that corrections have been made.
2. Review of Shop Drawings or Samples will be an additional service requiring payment by the Contractor if the Contractor submits a substitution for a product for which a Shop Drawing or Sample has previously been approved, unless the need for such change is beyond the control of Contractor.
3. Cost for additional review time will be billed to the Owner by the Design Professional for the actual hours required for the review of Shop Drawings by Design Professional and in accordance with the rates listed in Section 00 73 00 “Supplementary Conditions.”
4. A set-off will be included in each Application for Payment to pay the cost for the additional review. The set-off will be based on invoices submitted to the Owner for these services.
5. Need for more than one resubmission or any other delay in obtaining Design Professional’s approval of Shop Drawings will not entitle the Contractor to an adjustment in Contract Price or an extension of Contract Times.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

01 35 00 SPECIAL PROCEDURES

1.00 GENERAL

1.01 CONSTRUCTION SEQUENCE

A. Consider the sequences, duration limitations, and governing factors outlined in this Section to prepare the schedule for the Work.

B. Perform the Work not specifically described in this Section as required to complete the entire Project within the contract time.

C. The spillway electrical distribution system shall remain energized and operational with minimum downtime. At most one gate can be taken out of service at a time. Contractor shall provide back-up power and temporary cabling as required to achieve this. At the end of each workday full electrical service shall be provided to the rest of the gates. Permanent or emergency power cannot be disconnected for more than a total of 12 hours in a day.

D. Relief well pumps for Wells 4 and 10 shall remain fully operational with minimum downtime. At most one pump can be out of service a maximum of 24 hours at a time. Contractor shall provide back-up power, temporary starters, and cabling as required to achieve this.

E. Contractor shall submit as a formal submittal to the Owner/Engineer a detailed sequence of construction for the project.

F. Consider the sequence, duration limitations, and governing factors outlined in this Section to prepare the schedule for the work.

1.02 SHUT DOWNS AND PLANS OF ACTION

A. Shut downs of operations or equipment must be planned and scheduled.

1. Submit a written plan of action for approval for shutting down essential services. These include:

   a. Electrical power.

   b. Control power.

   c. Other designated functions.

2. Describe the following in the plan of action:

   a. Construction necessary.

   b. Utilities, piping, or services affected.

   c. Length of time the service or utility will be disturbed.

   d. Procedures to be used to carry out the Work.

   e. Plan of Action to handle emergencies.

   f. Contingency plan that will be used if the original schedule cannot be met.

3. Submit plan 2 weeks prior to beginning the Work.

4. Contractor shall understand the Toledo Bend Dam was designed and constructed to store surface water and to safely pass high flow events. Contractor shall conduct his means and methods as necessary to complete the work associated with the contract documents. It is the Contractor's responsibility to keep abreast of the weather conditions at all times. Toledo Bend Project Joint Operation may temporarily halt construction if and when gate operations are imminent; however, Contactor shall understand that gate operations are possible at Toledo Bend Dam and advanced notice may not be available. In these situations, Contractor will be required to immediately terminate construction until such time that the gate operations conclude, and Toledo Bend Joint Operation approves the Contractor to resume work. No change orders for demobilization charges and remobilization charges due to work stoppages caused by weather causing gate operations will be allowed.

1.03 CRITICAL OPERATIONS

A. The Owner has identified critical operations that must not be out of service longer than the designated maximum out of service time and/or must be performed only during the designated times. These have been identified in the table below:

Critical Operation	**Liquidated Damages (Dollars per Hour)**
More than one gate out of service.	$500
Spillway Electrical Service out for more than 12 hours	$500
Relief Well Pumps No.4 or No.10 out of service for more than 24 hours	$500

B. Submit a written plan of action for approval for critical operations.

1. Describe the following in the plan of action:

a. Construction necessary.

b. Utilities, piping, or services affected.

c. Length of time the service or utility will be disturbed.

d. Procedures to be used to carry out the Work.

e. Plan of action to handle emergencies.

f. Contingency plan that will be used if the original schedule cannot be met.

g. List of manpower, equipment, and ancillary supplies. Identify backups for key pieces of equipment such as excavators and pumps and key personnel such as welders.

2. Plan must be received by the Owner 2 weeks prior to beginning the Work.

C. Work affecting critical operations is to be performed on a 24-hour a day basis until Owner's normal operations have been restored.

D. Provide additional manpower and equipment as required to complete the Work affecting critical operations within the allotted time.

E. Include the cost for Work affecting critical operations in the contract price.

F. Liquidated damages will be assessed if Work on critical operations is not completed within the time indicated.

   1. These items are critical to the dam/spillway operations.

   2. Loss of dam/spillway operations can subject the Owner to limited Dam Safety Procedures and fines from regulatory agencies.

   3. Liquidated damages have been established for each critical operation.

2.00 PRODUCTS (NOT APPLICABLE)

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 40 00 QUALITY REQUIREMENTS

1.00 GENERAL

1.01 CONTRACTOR'S RESPONSIBILITIES

A. Control the quality of the Work and verify that the Work meets the standards of quality established in the Contract Documents.

1. Inspect the Work of the Contractor, Subcontractors and Suppliers. Correct defective Work.

2. Inspect products and materials to be incorporated into the Project. Ensure that Suppliers of raw materials, parts, components, assemblies, and other products have adequate quality control system to ensure that quality products are produced. Provide only products that comply with the Contract Documents.

3. Provide and pay for the services of an approved professional materials testing laboratory acceptable to the Owner to insure that products proposed for use fully comply with the Contract Documents.

4. Provide all facilities and calibrated equipment required for quality control tests.

5. Provide consumable construction materials of adequate quality to provide a finished product that complies with the Contract Documents.

6. Perform tests as indicated in this and other sections of the Specifications. Schedule the time and sequence of testing with the Construction Manager. All quality control testing is to be observed by the Construction Manager or designated representative.

7. Maintain complete inspection and testing records at the Site and make them available to Owner, Engineer and Construction Manager.

B. Provide and pay for the services of an approved professional materials testing laboratory acceptable to the Owner to insure that Work fully complies with the Contract Documents. Provide services of a testing laboratory capable of performing a full range of testing procedures complying with the standards for testing procedures specified. Provide personnel certified to perform the test required. Obtain Owners' approval for the testing laboratory before testing is performed.

C. Technical specifications govern if any requirements of this section conflicts with the requirements of the technical specifications.

1.02 QUALITY ASSURANCE ACTIVITIES BY THE OWNER

A. Owner may perform its own quality assurance test independent of the Contractor's Quality Control Program or as otherwise described in the Contract Documents. Provide labor, materials, tools, equipment, and related items for testing by the Owner including, but not limited to temporary construction required for testing and operation of new and existing utilities. Assist the Owner, Engineer, Construction Manager, and testing organizations in performing quality assurance activities.

1. Provide access to the Work and to the Supplier's operations at all times Work is in progress.

2. Cooperate fully in the performance of sampling, inspection, and testing.
3. Furnish labor and facilities to:
    a. Provide access to the Work to be tested.
    b. Obtain and handle Samples for testing at the Site or at the source of the product to be tested.
    c. Provide calibrated scales and measuring devices for the Owner's use.
    d. Facilitate inspections and tests.
    e. Provide adequate lighting to allow Owner observations.
    f. Store and cure test Samples.
4. Furnish copies of the tests performed on materials and products.
5. Provide adequate quantities of representative product to be tested to the laboratory at the designated location.
6. Give the Construction Manager adequate notice before proceeding with Work that would interfere with testing.
7. Notify the Construction Manager and the testing laboratory prior to the time that testing is required. Lead time is to be adequate to allow arrangements to be made for testing.
8. Do not proceed with any Work until testing services have been performed and results of tests indicate that the Work is acceptable.
9. Provide complete access to the Site and make Contract Documents available.
10. Provide personnel and equipment needed to perform sampling or to assist in making the field tests.
11. Quality assurance testing performed by the Owner will be paid for by the Owner, except for verification testing performed by the Owner, which shall be paid for by the Contractor as described in Paragraph 1.06.

B. Quality assurance activities of the Owner, Engineer or Construction Manager through their own forces or through contracts with materials testing laboratories and survey crews are for the purpose of monitoring the results of the Contractor's Work to see that it is in compliance with the requirements of the Contract Documents.

C. Quality assurance activities of the Owner and Engineer or non-performance of quality assurance activities:
1. Do not relieve the Contractor of its responsibility to perform Work and furnish materials and products and constructed Work conforming to the requirements of the Contract Documents.
2. Do not relieve the Contractor of its responsibility for providing adequate quality control measures.
3. Do not relieve the Contractor of its responsibility for damage to or loss of the material, product or Work before Owner's acceptance.

4. Do not constitute or imply Owner's acceptance.

5. Do not affect the continuing rights of the Owner after Owner's acceptance of the completed Work.

D. The presence or absence of the Owner's Resident Representative or Engineer does not relieve the Contractor from any contract requirement, nor is the Owner's Resident Representative or Engineer authorized to change any term or condition of the Contract Documents without the Owner's written authorization in a Field Order or Change Order.

E. Failure on the part of the Owner, Engineer or Construction Manager to perform or test products or constructed Works in no way relieves the Contractor of the obligation to perform Work and furnish materials conforming to the Contract Documents.

F. All materials and products are subject to Owner's quality assurance observations or testing at any time during preparation or use. Material or products which have been tested or observed or approved by Owner at a supply source or staging area may be re-observed or re-tested by Owner before or during or after incorporation into the Work, and rejected if they do not comply with the Contract Documents.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 "Document Management" and shall include:

1. A written Quality Management Plan that establishes the methods of assuring compliance with the Contract Documents. Submit this program as Record Data.

2. A Statement of Qualifications for the proposed testing laboratory. The statement of qualifications is to include a list of the engineers and technical staff that will provide testing services on the Project, descriptions of the qualifications of these individuals, list of tests that can be performed, equipment used with date of last certification and a list of recent projects for which testing has been performed with references for those projects.

3. Test reports per Paragraph 1.07 of this Specification. Reports are to certify that products or constructed Works are in full compliance with the Contract Documents or indicate that they are not in compliance and describe how they are not in compliance.

4. Provide Certified Test Reports on materials or products to be incorporated into the Project. Reports are to indicate that material or products are in full compliance with the Contract Documents or indicate that they are not in compliance and describe how they are not in compliance.

1.04 STANDARDS

A. Provide a testing laboratory that complies with the ACIL (American Council of Independent Laboratories) "Recommended Requirements for Independent Laboratory Qualifications."

B. Perform testing per recognized test procedures as listed in the various sections of the Specifications, standards of the State Department of Highways and Public Transportation, American Society of Testing Materials (ASTM), or other testing associations. Perform tests in accordance with published procedures for testing issued by these organizations.

1.05 DELIVERY AND STORAGE

A. Handle and protect test specimens of products and construction materials at the Site in accordance with recognized test procedures.

1.06 VERIFICATION TESTING

A. Provide verification testing when tests indicate that materials or the results of construction activities are not in conformance with Contract Documents.

B. Verification testing is to be provided at the Contractor's expense to verify products or constructed works are in compliance after corrections have been made.

C. Tests must comply with recognized methods or with methods recommended by the testing laboratory and approved by the Engineer.

1.07 TEST REPORTS

A. Test reports are to be prepared for all tests.

1. Tests performed by testing laboratories may be submitted on their standard test report forms. These reports must include the following:

a. Name of the Owner, project title and number, equipment installer and general contractor.

b. Name of the laboratory, address, and telephone number.

c. Name and signature of the laboratory personnel performing the test.

d. Description of the product being sampled or tested.

e. Date and time of sampling, inspection, and testing.

f. Date the report was issued.

g. Description of the test performed.

h. Weather conditions and temperature at time of test or sampling.

i. Location at the Site or structure where the test was taken.

j. Standard or test procedure used in making the test.

k. A description of the results of the test.

l. Statement of compliance or non-compliance with the Contract Documents.

m. Interpretations of test results, if appropriate.

2. Submit reports on tests performed by Contractor or his suppliers or vendors on the forms provided by the Engineer.

3. Engineer will prepare test reports on test performed by the Engineer.

B. Distribute copies of the test reports to the Construction Manager and post to FNiManager within 24 hours of completing the test. Flag tests reports with results that do not comply with Contract Documents for immediate attention. Hard copies of test reports are to be distributed to individuals designated at the pre-construction conference:

Recipient	No. of Copies
Owner	2
Engineer	1
Construction Manager	1
Contractor	1

C. Payment for Work subject to testing may be withheld until the Contractor's quality control test reports of the Work are submitted to the Engineer or the Owner's Resident Representative.

1.08 NON-CONFORMING WORK

A. Immediately correct any Work that does not comply with the Contract Documents or submit a written explanation of why the Work is not to be corrected immediately and when corrective action to the Work will be performed.

B. Payment for non-conforming Work shall be withheld until Work is brought into compliance with the Contract Documents.

1.09 LIMITATION OF AUTHORITY OF THE TESTING LABORATORY

A. The testing laboratory representatives are limited to providing consultation on the test performed and to an advisory capacity.

B. The testing laboratory is not authorized to:

1. Alter the requirements of the Contract Documents.
2. Accept or reject any portion of the Work.
3. Perform any of the duties of the Contractor.
4. Stop the Work.

1.10 QUALITY CONTROL PLAN

A. Submit Contractor's Quality Control Plan that identifies personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the Quality Control Plan or acceptance of an interim plan applicable to the particular feature of Work to be started. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a Quality Control Plan or another interim plan containing the additional features of Work to be started.

B. Content of the Quality Control Plan. The Quality Control Plan shall include, as a minimum, the following to address all construction operations, both on-site and off-site, including work by Subcontractors and Suppliers:

1. A description of the quality control organization, including a chart showing lines of authority and acknowledgement that the quality control staff shall implement the quality control program for all aspects of the Work specified.

2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a quality control function.

3. A copy of the letter to the Quality Control Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the Quality Control Manager, including authority to stop Work which does not comply with the Contract Documents or will result in Work that does not comply with the Contract Documents. The Quality Control Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Construction Manager.

4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of Subcontractors and Suppliers.

5. Control, verification, and acceptance testing procedures for each specific test is to include the test name, specification paragraph requiring test, feature of Work to be tested, test frequency, person responsible for each test, applicable industry testing standards and laboratory facilities to be used for the test.

6. Procedures for tracking phases of quality control, verification, and acceptance tests including documentation.

7. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Indicate how documentation of the verification process for deficiencies will be made.

8. Reporting procedures, including proposed reporting formats.

9. The name of the proposed testing laboratory along with documentation of qualifications, a list of tests that can be performed, and a list of recent projects for which similar testing has been performed with references from those projects.

C. Notification of Changes. After submittal of the Quality Control Plan, the Contractor shall notify the Owner in writing of any proposed changes.

D. Coordination Meeting. After the Pre-construction Meeting and before start of construction, the Contractor shall meet with the Owner, Engineer and Construction Manager to discuss the Contractor's Quality Control Plan. The Quality Control Plan shall be submitted a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the Quality Control operations, testing, administration of the system for both on-site and off-site Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance. Revise the Quality Management Plan to reflect comments and recommended changes resulting from this meeting.

2.00 PRODUCTS

2.01 TESTING APPARATUS

A. Furnish testing apparatus and related accessories necessary to perform the tests.

3.00 EXECUTION

3.01 QUALITY CONTROL PROGRAM

A. Perform quality control observations and testing as required in each section of the Specifications and where indicated on the Drawings.

B. Provide a quality control program that includes the following phases for each definable Work task. A definable Work task is one which is separate and distinct from other tasks, has separate control requirements, may be provided by different trades or disciplines, or may be Work by the same trade in a different environment.

1. Planning Phase: Perform the following before beginning each definable Work task:

a. Review the contract drawings.

b. Review submittals and determine that they are complete in accordance with the Contract Documents.

c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Examine the work area to assure that all required preliminary Work has been completed and complies with the Contract Documents.

e. Examine required materials, equipment, and sample Work to assure that they are on hand, conform to submittals, and are properly stored.

f. Review requirements for quality control inspection and testing.

g. Discuss procedures for controlling quality of the Work. Document construction tolerances and workmanship standards for the Work task.

h. Check that the portion of the plan for the Work to be performed incorporates submittal comments.

i. Discuss results of planning phase with the Construction Manager. Conduct a meeting attended by the Quality Control Manager, the Construction Manager, superintendent, other quality control personnel as applicable, and the foreman responsible for the Work task. Instruct applicable workers as to the acceptable level of workmanship required in order to meet the requirements of the Contract Documents. Document the results of the preparatory phase actions by separate meeting minutes prepared by the Quality Control Manager and attached to the quality control report.

j. Do not move to the next phase unless results of investigations required for the planning phase indicate that requirements have been met.

2. Work Phase: Complete this phase after the Planning Phase:

a. Notify the Construction Manager at least 24 hours in advance of beginning the Work and discuss the review of the planning effort to indicate that requirements have been met.

b. Check the Work to ensure that it is in full compliance with the Contract Documents.

c. Verify adequacy of controls to ensure full compliance with Contract Documents. Verify required control inspection and testing is performed.

d. Verify that established levels of workmanship meet acceptable workmanship standards. Compare with required sample panels as appropriate.

e. Repeat the Work phase for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

3. Follow-up Phase: Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements:

a. Make checks daily and record observations in the quality control documentation.

b. Conduct follow-up checks and correct all deficiencies prior to the start of additional Work tasks that may be affected by the defective Work. Do not build upon nor conceal non-conforming Work.

c. Conduct a review of the Work 1 month prior to the expiration of the correction period prescribed in the General Conditions with the Owner and Construction Manager. Correct defects as noted during the review.

C. Conduct additional planning and Work phases if:

1. The quality of on-going Work is unacceptable.

2. Changes are made in applicable quality control staff, on-site production supervision or work crew.

3. Work on a task is resumed after a substantial period of inactivity.

4. Other quality problems develop.

3.02 CONCRETE

A. Test concrete in accordance with requirements of Sheet S-2 of the Plans.

3.03 ELECTRICAL TESTING

A. Qualifications:

1. Perform testing using qualified personnel with a minimum of 5 years' experience installing and testing electrical equipment and machinery, unless otherwise specified.

2. Use testing firms or individuals to perform tests that have not provided services or materials used on the Project or are otherwise related or affiliated with other Contractors or Suppliers for this Project unless permitted by the Owner.

B. Report Forms: Complete appropriate test report neatly and in ink for the items being tested. Note listed data that is not applicable or cannot be obtained as "N/A" or document with an explanation for the omission. Incomplete test forms will not be witnessed by the Construction Manager. Repeat tests not accepted. Substitute forms recording similar data and test equipment as that specified may be used if approved by the Engineer.

C. Test Equipment:

1. Provide test equipment and materials necessary to perform the requested tests.

2. Test equipment and apparatus shall be appropriate for the full range and duration of the test to be performed.

3. Demonstrate that the test equipment is functioning properly, prior to the commencement of the test. Suspend the test and repair or replace the equipment if test equipment fails during any portion of a test. Repeat the test in its entirety or as otherwise required by the Construction Manager.
4. Provide a copy of the test equipment calibration certificate to the Construction Manager prior to the commencement of the test. Provide test equipment that has been calibrated within 6 months of the date of the test using methods approved by the National Institute of Standards and Technology.

D. Execution:

1. In addition to the requirements of this Specification, Electrical Testing shall also be in accordance with Section 26 01 26 “Testing of Electrical Systems”.
2. Make appropriate repairs or replacements if the circuit, equipment or machinery being tested does not pass. Repeat test as directed by the Construction Manager.
3. If test procedures or equipment conflicts occur between the various sections of the Specifications and/or Supplier’s recommendations, the more rigid requirement prevails.

E. Electrical Cable:

1. Communication Cable and Conductors - Submit test forms to the Owner for approval prior to performing the following tests:
    a. Test shielded pair, signaling and computer cables for continuity, short circuits and grounds with a low voltage source, not to exceed the insulation rating of the conductors or jacket.
    b. Test fiber-optic cable between terminating ends for each circuit per the Supplier’s recommendation. Cables, splices (where permitted), and connectors shall be tested for continuity, band width (maximum), and attenuation losses.
2. 600-Volt Cable and Conductors:
    a. Test power and control conductors rated at 600 volts with an insulation resistance tester at 1000 volts, with respect to ground, and at 1000 volts with respect to all other conductors in each circuit.
    b. Verify suitable ground connections are provided and maintained throughout the test.
    c. Perform tests and record results as required by the “600-Volt Cable Test Report” or form provided by the Engineer.
    d. Test each circuit and record the results for continuity between terminating ends with a low voltage source.
    e. Provide additional tests and checks as recommended by the Supplier before energizing.
    f. Energize switchgear. Measure and record instrument indications for no-load and connected-load conditions.

F. Transformers:

1. Test single and three-phase, liquid filled and dry transformers rated 5 KVA and larger in accordance with the “Transformer Test Report” form.
2. Record the following information and attach to the test report.
    a. Verify proper operation of all fans, alarms, and other auxiliary and monitoring devices.
    b. Verify “tap changer” operation, if applicable, in all positions. Set and secure “tap changer” to position recommended by the Construction Manager or Engineer.
    c. Obtain insulating liquid sample from all liquid filled transformers. Submit sample to testing laboratory, approved by the Owner for analysis. Perform standard insulating liquid tests as required by the Construction Manager or Engineer. Deliver test results to the Owner within 30 days after sampling.
    d. Perform insulation resistance tests at the test values shown below for the following equipment.
    e. Perform tests from each winding to ground and winding to winding. Primary and secondary sections shall be tested separately.
    f. Do not exceed the Supplier’s recommended maximum test values or procedures.

Transformer Coil Rating	Test Voltage
0-600 volts	1000 volts
601-5000 volts	2500 volts
5001-15,000 volts	5000 volts
15,001-39,000 volts	10,000 volts

    g. Provide additional tests and checks as recommended by the Supplier before energizing.
    h. Energize transformer. Measure and record primary and secondary volts and amps under no load and connected load conditions.

END OF SECTION

01 42 16 DEFINITIONS

1.00 GENERAL

1.01 SPECIFICATION TERMINOLOGY

A. "Engineer" or "Architect" means Freese and Nichols, Inc., Architects and Engineers, 801 Cherry Street, Ste. 2800, Fort Worth, Texas 76102, or its designated representative.

B. "Furnish" means to supply, deliver and unload materials and equipment at the project site ready to install.

C. "Install" means the operations at the project site including unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, training and similar operations required to prepare the materials and equipment for use, verify conformance with Contract Documents and prepare for acceptance and operation by the Owner.

D. "Provide" means to furnish and install materials and equipment.

E. "Perform" means to complete the operations necessary to comply with the Contract Documents.

F. "Indicated" means graphic representations, notes, or schedules on drawings, or other requirements in Contract Documents. Words such as "shown", "noted", "scheduled", are used to help locate the reference. No limitation on the location is intended unless specifically noted.

G. "Specified" means written representations in the bid documents or the technical specifications.

H. "Regulation" means laws, statutes, ordinances, and lawful orders issued by authorities having jurisdiction, as well as, rules, conventions, and agreements within the construction industry that control performance of work, whether they are lawfully imposed by authorities having jurisdiction or not.

I. "Installer" means an entity engaged by Contractor, either as an employee, subcontractor, or sub-subcontractor to install materials and/or equipment. Installers are to have successfully completed a minimum of five projects similar in size and scope to this project, have a minimum of five years of experience in the installation of similar materials and equipment, and comply with the requirements of the authority having jurisdiction.

J. "Manufacturer" means an entity engaged by Contractor, as a subcontractor, or sub-subcontractor to furnish materials and/or equipment. Manufacturers are to have a minimum of five years experience in the manufacture of materials and equipment similar in size, capacity and scope to the specified materials and equipment.

K. "Project site" means the space available to perform the work, either exclusively or in conjunction with others performing construction at the project site.

L. "Testing laboratory" means an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report and interpret the results of those inspections or tests.

M. "Listed" means equipment is included in a list published by a nationally recognized laboratory which makes periodic inspection of production of such equipment and states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.

N. "Labeled" means equipment that embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc., and production is periodically inspected in accordance with nationally recognized standards or tests to determine safe use in a specified manner.

O. "Certified" used in context with materials and equipment means the material and equipment has been tested and found by a nationally recognized testing laboratory to meet specification requirements, or nationally recognized standards if requirements are not specified, and is safe for use in the specified manner. Production of the equipment must be periodically inspected by a nationally recognized testing laboratory and the equipment must bear a label, tag, or other record of certification.

"Certified" used in context with labor performance or ability to install materials and equipment means that the abilities of the proposed installer have been tested by an representative of the specified testing agency authorized to issue certificates of competency and has met the prescribed standards for certification.

"Certified" used in context with test reports, payment requests or other statements of fact means that the statements made on the document are a true statement as attested to by the certifying entity.

1.02 SPECIFICATION SENTENCE STRUCTURE

A. Specifications are written in modified brief style. Requirements apply to all work of the same kind, class, and type even though the word "all" is not stated.

B. Simple imperative sentence structure is used which places a verb as the first word in the sentence. It is understood that the words "furnish", "install", "provide", or similar words include the meaning of the phrase "The Contractor shall..." before these words.

C. It is understood that the words "directed", "designated", "requested", "authorized", "approved", "selected", or similar words include the meaning of the phrase "by the Engineer" after these words unless otherwise stated. Use of these words does not extend the Engineer's responsibility for construction supervision or responsibilities beyond those defined in the General Conditions.

D. "At no additional cost to Owner", "With no extra compensation to Contractor", "At Contractor's own expense", or similar words mean that the Contractor will perform or provide specified operation of work without any increase in the Contract Amount. It is understood that the cost for performing all work is included in the amount bid and will be performed at no additional cost to the Owner unless specifically stated otherwise.

1.03 DOCUMENT ORGANIZATION

A. The contract requirements described in the General Conditions, Supplementary Conditions and Division 1 apply to each and all specification sections unless specifically noted otherwise.

B. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing work among subcontractors, or to establish the extent of work to be performed by any trade, subcontractor or vendor. Specifications or details do not need to be indicated or specified in each specification or drawing. Items shown in the contract documents are applicable regardless of location in the Contract Documents.

C. Standard paragraph titles and other identifications of subject matter in the specifications are intended to aid in locating and recognizing various requirements of the specifications. Titles do not define, limit, or otherwise restrict specification text.

D. Capitalizing words in the text does not mean that these words convey special or unique meanings or have precedence over other parts of the Contract Documents. Specification text governs over titling and it is understood that the specification is to be interpreted as a whole.

E. Drawings and specifications do not indicate or describe all of the work required to complete the project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials or equipment required for a complete and functional system even if they are not detailed or specified.

1.04 INTERPRETATIONS OF DOCUMENTS

A. Comply with the most stringent requirements where compliance with two (2) or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, unless Contract Documents indicate otherwise.

1. Quantity or quality level shown or indicated shall be minimum to be provided or performed in every instance.

2. Actual installation may comply exactly with minimum quality indicated, or it may exceed that minimum within reasonable limits.

3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.

4. Refer instances of uncertainty to the Engineer for a decision before proceeding.

B. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the drawings but are not included in the specifications.

1.05 REFERENCE STANDARDS

A. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract Documents where Contract Documents include more stringent requirements than the referenced standards.

1. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.

2. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the work except as otherwise limited by the Contract Documents. The Engineer determines whether code or standard is applicable, or which of several are applicable.

B. Consider a referenced standard to be the latest edition with supplements or amendments when a standard is referred to in an individual specification section but is not listed by title and date.

C. Trade association names and title of general standards are frequently abbreviated. Acronyms or abbreviations used in the Contract Documents mean the recognized name of trade association, standards generating organization, authority having jurisdiction, or other entity applicable in the context of the Contract Documents. Refer to "Encyclopedia of Associations," published by Gale Research Company.

D. Make copies of reference standards available as requested by Engineer or Owner.

1.06 SUBSTITUTIONS AND EQUAL PRODUCTS

Provide materials and equipment manufactured by the entities specifically listed in each technical specification section. Submit a Contractor's Modification Request per Section 01 33 00, “Submittal Procedures” for substitution of materials and equipment of manufacturers not specifically listed or for materials and equipment that does not strictly comply with the Contract Documents.

1.07 SUBSTITUTIONS AND EQUAL PRODUCTS

Contractor may provide "equal" products manufactured by manufacturers other than those specifically listed in the technical specification section unless it is specifically stated that only the materials and equipment of the specified manufacturers shall be provided. Provide Submittals for proposed “equal” non-specified products per Section 01 33 00 “Submittal Procedures” for any materials or equipment not specifically listed. Submit a Contractor's Modification Request for substitution of materials and equipment of other manufacturers or for materials and equipment that does not strictly comply with the Contract Documents. A Field Order or Change Order will be issued if the contract modification is approved.

END OF SECTION

01 50 00 TEMPORARY FACILITIES

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish temporary facilities, including the Contractor's field office, Engineer's sanitation facility, storage sheds, and temporary utilities needed to complete the work.

B. Furnish, install, and maintain temporary project identification signs. Provide temporary on-site informational signs to identify key elements of the construction facilities. Do not allow other signs to be displayed.

C. Cost for Temporary Facilities as described in this section and provided by Suppliers and Subcontractors as described in this section are to be included in the Cost of Work. Contractor efforts are included in the Contractor's fee for Construction Phase Services.

1.02 QUALITY ASSURANCE

A. Testing: Inspect and test each service before placing temporary utilities in use. Arrange for all required inspections and tests by regulatory agencies, and obtain required certifications and permits for use.

1.03 DELIVERY AND STORAGE

A. Arrange transportation, loading, and handling of temporary buildings and sheds.

1.04 JOB CONDITIONS

A. Locate buildings and sheds at the job site as indicated or as approved by the Owner.

B. Prepare the site by removing trees, brush, or debris and performing demolition or grubbing needed to clear a space adequate for the project.

C. Pay for the utilities used by temporary facilities during construction, if applicable.

D. Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in the performance of the work.

E. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the work.

F. Remove services and facilities when approved by the Engineer.

G. Operate temporary facilities in a safe and efficient manner, if applicable.

1. Restrict loads on temporary services or facilities to within their designed or designated capacities.

2. Provide sanitary conditions. Prevent public nuisance, or hazardous conditions from developing or existing at the site.

3. Prevent freezing of pipes, flooding, or the contamination of water.

4. Maintain site security and protection of the facilities.

5. Owner will not provide potable water or power for the project.

1.05 OPTIONS

A. Construction offices may be prefabricated buildings on skids or mobile trailers.

B. Storage sheds may be prefabricated buildings on skids or truck trailers.

2.00 PRODUCTS

2.01 SIGN MATERIALS

A. Provide new or used signs, wood or metal with structure and framing in sound condition. Materials are to be structurally adequate and suitable for the indicated finish.

B. Provide 3/4-inch exterior grade A/D face veneer plywood with medium density overlay for sign surface.

C. Bolts, brackets, fasteners, and other hardware are to be galvanized or stainless steel.

2.02 TEMPORARY STORAGE BUILDINGS

A. Furnish storage buildings of adequate size to store any materials or equipment delivered to the site that might be affected by weather.

2.03 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities at the job site from the commencement of the project until project conclusion. Maintain these facilities in a clean and sanitary condition at all times, and comply with the requirements of the local health authority. On large sites, provide portable toilets at such locations that no point in the site shall be more than 600 feet from a toilet.

B. Use these sanitary facilities.

3.00 EXECUTION

3.01 LOCATION OF TEMPORARY FACILITIES

A. Locate all temporary facilities in areas approved by the Owner. Construct and install signs at locations approved by the Owner. Install informational signs so they are clearly visible.

3.02 PROJECT IDENTIFICATION AND SIGNS

A. Arrange for and erect a sign for the project site in accordance with the sign information provided in the Contract Documents. Sign will include identification of the Owner, Engineer, and Contractor (including appropriate logos, as required). Paint sign on a 4-foot by 8-foot by 3/4-inch exterior grade plywood board. Frame plywood with 2 x 4 wood frame and mount on not less than two 4 x 4 posts. House plywood board in a channel routed 1/2 inch deep in the 2 x 4 frame. Shoulder, glue, and screw corners. Owner will designate location of the sign.

3.03 TEMPORARY LIGHTING

A. Provide portable flood lights at any time that work will be performed at night. Provide adequate lighting to provide sufficient light at any location work is being performed.

B. Work outside the hours or 6:30 a.m. to 5:30 p.m. will not normally be permitted. Obtain prior authorization from the Owner and Engineer for any night work required."

3.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary buildings, sheds, and utilities at the conclusion of the project and restore the site to original condition or finished in accordance with the drawings.

B. Remove informational signs upon completion of construction.

C. Remove project identification signs, framing, supports, and foundations upon completion of the project.

3.05 MAINTENANCE

A. Maintain signs and supports in a neat, clean condition. Repair damage to structures, framings, or signs.

B. Repair any damage to permanent structures or finishes caused by placement or removal of temporary signage.

END OF SECTION

01 57 00 TEMPORARY CONTROLS

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.

B. Construct temporary impounding works, channels, diversions, furnishing and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project.

C. Provide a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Louisiana Department of Environmental Quality (LDEQ) General Permit, file required legal notices and obtain required permits prior to beginning any construction activity.

D. Provide labor, materials, equipment, and incidentals necessary to prevent storm water pollution for the duration of the Project. Provide and maintain erosion and sediment control structures as required to preventive sediment and other pollutants from the Site from entering any storm water system, including open channels. Remove pollution control structures when no longer required to prevent storm water pollution.

E. Cost for Temporary Controls as described in this Section and provided by Suppliers and Subcontractors as described in this Section are to be included in the Cost of Work.

1.02 QUALITY ASSURANCE

A. Construct and maintain temporary controls with adequate workmanship using durable materials to provide effective environmental management systems meeting the requirements of the Contract Documents and requiring minimal maintenance that will disrupt construction activities while providing adequate protection of the environment.

B. Periodically inspect systems to determine that they are meeting the requirements of the Contract Documents.

1.03 SUBMITTALS

A. Provide copies of notices, records and reports required by the Contract Documents or regulations as Record Data in accordance with Section 01 33 00 “Document Management.”

B. Provide documents requiring approval by the Owner or Engineer as Shop Drawings in accordance with Section 01 33 00 “Document Management.”

1.04 STANDARDS

A. Provide a storm water pollution prevention plan that complies with Local, State, and Federal requirements. Comply with all requirements of the with Louisiana Department of Environmental Quality (LDEQ) General Permit for storm water discharges from construction activities under the Louisiana Pollutant Discharge Elimination System (LPDES) program for the duration of the Project.

1.05 STORM WATER POLLUTION CONTROL

A. If 1.0 acres or more of soil is disturbed, then the Contractor is required to comply with all requirements of the LDEQ General Permit for storm water discharges from construction activities under the Louisiana Pollutant Discharge Elimination System (LPDES) program for the duration of the Project:

1. Develop a Storm Water Pollution Prevention Plan (SWPPP) meeting all local, state, and federal requirements. Develop and implement appropriate Best Management Practices as established by local agencies of jurisdiction. SWPPP must be updated and amended as required by the General Permit.

2. Provide all monitoring and/or sampling required for reporting to the LDEQ.

3. Submit reports to the LDEQ as required as a condition of the permit.

4. Submit copies of the reports to the Engineer as Record Data in accordance with Section 01 33 00 “Document Management.”

5. Retain copies of these documents on-Site at all times for review and inspection by the Owner or regulatory agencies. Post or make a copy of the permit available for review as required by regulations.

6. Pay all costs associated with complying with the provisions of the General Permit. Assume solely responsible for implementing, updating, and modifying the General Permit per regulatory requirements the SWPPP and Best Management Practices.

B. Use forms required by the LDEQ to file the Notice of Intent. Submit the Notice of Intent at least 48 hours prior to the start of construction. Develop and complete the SWPPP prior to submitting the Notice of Intent. Provide draft copies of the Notice of Intent, SWPPP, and any other pertinent LDEQ submittal documents to Owner for review prior to submittal to the LDEQ.

1.06 POLLUTION CONTROL

A. Prevent the contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Provide adequate measures to prevent the creation of noxious air-borne pollutants. Prevent dispersal of pollutants into the atmosphere. Do not dump or otherwise discharge noxious or harmful fluids into drains or sewers, nor allow noxious liquids to contaminate public waterways in any manner.

B. Provide equipment and personnel and perform emergency measures necessary to contain any spillage.

1. Contain chemicals in protective areas and do not dump on soil. Dispose of such materials at off-site locations in an acceptable manner.

2. Excavate contaminated soil and dispose at an off-site location if contamination of the soil does occur. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.

3. Provide documentation to the Owner which states the nature and strength of the contaminant, method of disposal, and the location of the disposal site.

4. Comply with local, State and Federal regulations regarding the disposal of pollutants.

C. Groundwater or run-off water which has come into contact with noxious chemicals, sludge, or sludge-contaminated soil is considered contaminated. Contaminated water must not be allowed to enter streams or water courses, leave the Site in a non-contained form or enter non-contaminated areas of the Site.

1. Pump contaminated water to holding ponds constructed by the Contractor for this purpose, or discharge to areas on the interior of the Site, as designated by the Engineer.
2. Construct temporary earthen dikes or take other precautions and measures as required to contain the contaminated water and pump to a designated storage area.
3. Wash any equipment used for handling contaminated water or soil within contaminated areas three times with uncontaminated water prior to using such equipment in an uncontaminated area. Dispose of wash water used to wash such equipment as contaminated water.

1.07 EARTH CONTROL

A. Remove excess soil, spoil materials and other earth not required for backfill at the time of generation. Control stockpiled materials to eliminate interference with Contractor and Owner's operations.

B. Dispose of excess earth off the Site. Pay cost for disposal unless otherwise noted. Provide written approval by the property owner for all disposal on private property, and approval by the Owner if such disposal affects the use of Site or other easements.

1.08 MANAGEMENT OF WATER

A. Manage water resulting from rains or ground water at the Site. Maintain trenches and excavations free of water at all times.

B. Lower the water table in the construction area by acceptable means if necessary to maintain a dry and workable condition at all times. Provide drains, sumps, casings, well points, and other water control devices as necessary to remove excess water.

C. Provide continuous operation of water management actions. Maintain standby equipment to provide proper and continuous operation for water management.

D. Ensure that water drainage does not damage adjacent property. Divert water into the same natural watercourse in which its headwaters are located, or other natural stream or waterway as approved by the Owner. Assume responsibility for the discharge of water from the Site.

E. Remove the temporary construction and restore the Site in a manner acceptable to the Engineer and to match surrounding material at the conclusion of the Work.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials meeting regulatory requirements.

3.00 EXECUTION

3.01 CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY CONTROLS

A. Construct temporary controls in accordance with regulatory requirements.

B. Maintain controls in accordance with regulatory requirements where applicable, or in accordance with the requirements of the Contract Documents.

C. Remove temporary control when no longer required, but before the Project is complete. Correct any damage or pollution that occurs as the result of removing controls before the point where they are no longer required.

END OF SECTION

01 60 00 PRODUCT REQUIREMENTS

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide products for this Project that comply with the requirements of this section. Specific requirements of the detailed equipment specification govern in the case of a conflict with the requirements of this Section.

B. Comply with applicable specifications and standards.

C. Comply with size, make, type, and quality specified or as modified per Section 01 31 13 “Project Coordination.”

1.02 QUALITY ASSURANCE

A. Design Criteria:

1. Assume responsibility for the design of the products to include structural stability and operational capability.

2. Design members to withstand all loads imposed by installation, erection, and operation of the product without deformation, failure, or adversely affecting the operational requirements of the product. Size and strength of materials for structural members are specified as minimums only.

3. Design mechanical and electrical components for all loads, currents, stresses, and wear imposed by start-up and normal operations of the equipment without deformation, failure, or adversely affecting the operation of the unit. Mechanical and electrical components specified for equipment are specified as the minimum acceptable for the equipment.

B. Coordination:

1. Provide coordination of the entire Project, including verification that structures, piping, and equipment components to be furnished and installed for this Project are compatible.

2. Determine that the equipment furnished for this Project is compatible with the Contract Document requirements and with the equipment and materials furnished by others.

3. Electrical components provided for equipment shall comply with all provisions of the Contract Documents.

4. Protective coatings and paints applied to equipment shall be fully compatible with the final coatings to be field applied in accordance with the Contract Documents.

C. Adaptation of Equipment:

1. Drawings and Specifications are prepared for the specified products. Make modifications to incorporate the products into the Project at no cost to the Owner, if a substitution for a product is requested and approved in accordance with Section 01 31 13 “Project Coordination.”

2. Do not provide a product with a physical size that exceeds the available space. Consideration may be given to the acceptance of these products or equipment if the Contractor assumes all costs necessary to incorporate the item and the Engineer approves such revisions.
3. Coordinate electrical requirements for the products to be installed in the Project, including revisions in electrical equipment components wiring and other factors necessary to incorporate the component.

1.03 SUBMITTALS

A. Provide Submittals in accordance with Section 01 33 00 “Document Management,” and shall include:
1. Certificates of Adequacy of Design, as described in Section 01 33 00 “Submittal Procedures.”
2. Equipment Installation Reports per Section 01 75 00 “Starting and Adjusting.”
3. Other documentation as required by detailed equipment specifications.

1.04 STANDARDS

A. The applicable industry standards referenced in the Specifications shall apply as if written here in its entirety.
B. Except where otherwise indicated, structural and miscellaneous fabricated steel used in items of equipment shall conform to the Standards of the American Institute of Steel Construction.

1.05 GUARANTEES AND WARRANTIES

A. Guarantee and or Warranty products furnished by the Contractor under this Contract against:
1. Faulty or inadequate design.
2. Improper assembly or erection.
3. Defective workmanship or materials.
4. Leakage, breakage, or other failure.
B. Guarantee and or Warranty the products installed under this Contract, including products furnished by the Owner, against leakage, breakage, or other failure due to improper assembly or erection and against improper installation of the equipment. The guarantee and or Warranty period shall be as defined in the General Conditions. Individual specification sections may have more stringent warranty requirements than stated in the General Conditions. The most stringent warranty will be required in the event of any difference in the two aforementioned locations.

2.00 PRODUCTS

2.01 MATERIALS

A. Design, fabricate, assemble, deliver and install according to normally accepted engineering and shop practices, except where a higher standard of quality is required by the Contract Documents.

B. Manufacture like parts of duplicate units to standard sizes and gages. Like parts are to be interchangeable.

C. Two or more items of the same kind are to be identical and made by the same Supplier.

D. Provide products suitable for the intended service.

E. Adhere to the equipment capacities, sizes, and dimensions indicated by the Contract Documents.

F. Do not use products for any purpose other than that for which it is designed.

G. Provide new products unless previously used products are specifically allowed in the Contract Documents.

H. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

I. Materials shall be suitable for service conditions.

J. Iron castings shall be tough, close-grained gray iron free from blowholes, flaws, or excessive shrinkage and shall conform to ASTM A48.

K. Structural members shall be considered as subject to shock or vibratory loads.

L. Unless otherwise indicated, steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4-inch thick. All edges are to be chamfered to preclude any sharp exposed edges.

2.02 EQUIPMENT APPURTENANCES

A. Cover belt or chain drives, fan blades, couplings, and other moving or rotating parts on all sides by a safety guard.

1. Fabricate safety guards from 16 USS gage or heavier galvanized or aluminum-clad sheet steel or 1/2-inch mesh galvanized expanded metal.

2. Design guards for easy installation and removal.

3. Provide galvanized supports and accessories for each guard.

4. Provide stainless steel bolts and hardware.

5. Provide safety guards in outdoor locations designed to prevent the entrance of rain and dripping water.

2.03 ANCHOR BOLTS

A. Provide suitable anchor bolts for each product.

B. Provide anchor bolts, with templates or setting drawings, sufficiently early to permit setting the anchor bolts when the structural concrete is placed.

C. Provide two nuts for each bolt.

D. Provide anchor bolts for products mounted on baseplates that are long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

E. Provide stainless steel anchor bolts, nuts, and washers.

2.04 SPECIAL TOOLS AND ACCESSORIES

A. Furnish tools, instruments, lifting and handling devices, and accessories necessary for proper maintenance and adjustment that are available only from the Product Vendor or are not commonly available.

2.05 EQUIPMENT IDENTIFICATION PLAQUES

A. Provide a plaque for each piece of equipment in accordance with Section 26 05 53 "Identification for Electrical Systems."

2.06 LUBRICATION SYSTEMS FOR EQUIPMENT

A. Provide equipment lubricated by systems which:

1. Require attention no more frequently than weekly during continuous operation.
2. Do not require attention during start up or shutdown.
3. Do not waste lubricants.

B. Provide lubricants to fill lubricant reservoirs and to replace lubricant consumed during testing, start up, and operation prior to acceptance of equipment by the Owner.

2.07 INSULATION OF PIPING

A. Insulate all piping on or related to equipment as required to prevent freezing under any condition. Insulate piping per the Supplier's written instruction or per Section 23 07 19 "HVAC Piping Insulation" whichever is more stringent.

3.00 EXECUTION

3.01 INSTALLATION

A. Install equipment including equipment pre-selected or furnished by the Owner. Assume responsibility for proper installation, start-up and making the necessary adjustments so that the equipment is placed in proper operating condition per Section 01 75 00 "Starting and Adjusting."

3.02 LUBRICATION

A. Lubricate all products provided or installed for this Project, including products furnished by the Owner, per the Supplier's written recommendations until the product is accepted by the Owner.

END OF SECTION

01 64 00 OWNER-FURNISHED GOODS AND SPECIAL SERVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Accept the transfer of Owner's pre-purchased Goods and Special Services defined in Paragraph 2.01 for installation.

B. Receive, install, and place Goods in operation in accordance with the Contract Documents and the associated agreement and contract documents for Goods and Special Services.

C. Provide Special Services in accordance with the Contract Documents and the associated agreement and contract documents for Goods and Special Services.

D. Provide documentation required by the Contract Documents and the contract documents for the pre-purchase of Goods and Special Services.

E. The contract documents for the pre-purchase of Goods and Special Services are included in referenced appendices.

1.02 DOCUMENTATION

A. Owner will provide documentation of the Transfer of Owner Furnished Goods and Special Services listed in Paragraph 2.01 using forms provided by the Construction Manager. These forms will fix the date for transfer of responsibilities for the receipt, storage, and installation of the Goods and provision of Special Services in accordance with the Contract Documents and the contract documents for the Goods and Special Services.

B. Owner will provide Shop Drawings prepared by the Seller.

C. Owner will provide operation and maintenance manuals prepared by the Seller.

D. Provide Equipment Installation Reports as required by Section 01 75 00 "Starting and Adjusting."

E. Provide other documentation required regarding the Goods and Special Services per the requirements of Section 01 33 00 "Document Management."

1.03 QUALITY ASSURANCE

A. Inspect the condition of all equipment accepted for installation and promptly advise the Construction Manager in writing of defects or damage.

B. Owner will provide through Seller the services of the Seller's representative to assist in installation of the equipment in accordance with Section 01 75 00 "Starting and Adjusting" and the contract documents for the pre-purchase of Goods and Special Services included in the referenced appendices.

PART 2 - PRODUCTS

2.01 OWNER-PURCHASED GOODS AND SPECIAL SERVICES

A. Owner has purchased and will provide the following Goods and Special Services to the Contractor:

Item	Description	Seller	Estimated Delivery Date	Appendix
1	60 kW Generator with External Fuel Tank	Loftin Equipment Company (Kohler)	Generator: December 2023 Fuel Tank: October 2023	A
2	Automatic Transfer Switch (ATS)	Loftin Equipment Company (Kohler)	ATS: February 2023	A

B. Products are described in the referenced appendices. Obtain clarification from the Construction Manager in the case of a disagreement between the above list and those specified elsewhere in the Contract Documents.

C. Assume responsibilities for coordination, installation, and startup of Owner-provided products as for products selected and purchased by the Contractor.

D. Payment for the product will be made directly by the Owner per the agreement between Owner (as Buyer) and Seller.

E. Include all other costs associated with the installation, startup, and initial operation of the product in the Contract Price.

PART 3 - EXECUTION

3.01 GENERAL

A. Arrange for delivery of the equipment to be furnished and furnish personnel and equipment as needed to carefully unload the items and either store them or set them in place.

B. Provide the labor, tools, equipment, and appurtenances necessary to inspect, install, and place in operating conditions all Goods pre-purchased by the Owner.

C. Assemble equipment disassembled for shipping. Determine the extent of assembly that will be required and include the cost of this assembly in the Contract Price.

D. Furnish all incidental items not supplied with the Goods that may be required for complete installation. Include the cost for these items in the Contract Price.

E. Owner will provide through Seller the services of the manufacturer's representative to assist in installation of the equipment in accordance with the specifications included in appendices and Section 01 75 00 "Starting and Adjusting." Schedule the representative to be available when needed to assist and instruct in the proper installation and adjustment of the equipment. All Work and adjustments must be done in accordance with the manufacturer's recommendations and instructions of the manufacturer's representative.

F. Owner will provide through Seller installation, documentation, and training as required in the contract documents for the pre-selected or pre-purchased equipment and as required by these Contract Documents.

END OF SECTION

01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

1.00 GENERAL

1.01 WORK INCLUDED

A. Comply with requirements of the General Conditions and specified administrative procedures in closing out the Construction Contract.

1.02 SUBMITTALS

A. Submit affidavits and releases on forms provided by the Engineer.

1.03 SUBSTANTIAL COMPLETION

A. Submit written notification that the Work or designated portion of the Work is substantially complete to the Engineer when the Work is considered to be substantially complete per the General Conditions. Include a list of the items remaining to be completed or corrected before the Project will be considered to be complete.

B. Engineer shall visit the Site to observe the Work within a reasonable time after notification is received to determine the status of completion.

C. Engineer shall issue notification to the Contractor that the Work is either substantially complete or that additional Work must be performed before the Project may be considered substantially complete.

1. Engineer shall notify the Contractor in writing of items that must be completed before the Project can be considered substantially complete.

    a. Correct the noted deficiencies in the Work.

    b. Issue a second written notice with a revised list of deficiencies when Work has been completed.

    c. Engineer shall revisit the Site and the procedure shall begin again.

2. Engineer shall issue a Certificate of Substantial Completion to the Owner when the Project is considered to be substantially complete. Certificate shall include a tentative list of items to be corrected before final payment.

    a. Owner will review and revise the list of items and notify the Engineer of any objections or other items that are to be included in the list.

    b. Engineer shall prepare and send to the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be corrected or completed.

    c. Review the list and notify the Engineer in writing of any objections within 10 days of receipt of the Certificate of Substantial Completion.

1.04 FINAL INSPECTION

A. Submit written certification in the form provided by the Engineer when the Project is complete and:

1. Contract Documents have been reviewed.
2. Work has been completed in compliance with the Contract Documents.
3. Equipment and systems have been tested per Contract Documents and are fully operational.
4. Final Operations and Maintenance Manuals have been provided to the Owner and all operator training has been completed.
5. Specified spare parts and special tools have been provided.
6. Work is complete and ready for final inspection.

B. Engineer shall make an inspection with the Owner and appropriate regulatory agencies to determine the status of completeness within a reasonable time after the receipt of the Certificate.

C. Engineer shall issue notice that the Project is complete or notify the Contractor that Work is not complete or is defective.
1. Submit the request for final payment with Closeout submittals described in Paragraph 1.07 if notified that the Project is complete and the Work is acceptable.
2. Upon receipt of notification from the Engineer that Work is incomplete or defective, take immediate steps to remedy the stated deficiencies. Send a second certification to the Engineer when Work has been completed or corrected.
3. Engineer shall re-visit the Site and the procedure will begin again.

1.05 REINSPECTION FEES

A. Pay fees to the Owner to compensate the Engineer for reinspection of the Work required by the failure of the Work to comply with the claims of status of completion made by the Contractor.

B. Owner may withhold the amount of these fees from the Contractor's final payment.

C. Cost for additional inspections will be billed to the Owner by the Engineer for the actual hours required for the reinspection and preparation of related reports in accordance with the rates provided in the Supplemental Conditions.

1.06 CLOSEOUT SUBMITTALS TO THE ENGINEER

A. Record Drawings per Section 01 31 00 "Project Coordination."

B. Keys and keying schedule.

C. Warranties and bonds.

D. Evidence of payment or release of liens on the forms provided by the Engineer and as required by the General Conditions.

E. Consent from Surety to Final Payment.

F. Equipment installation reports on equipment.

G. Shop drawings, record data, Operations and Maintenance Manuals, and other submittals as required by the Contract Documents.

H. Specified spare parts and special tools.

I. Certificates of Occupancy, operating certificates, or other similar releases required to allow the Owner unrestricted use of the Work and access to services and utilities.

J. Evidence of final, continuing insurance, and bond coverage as required by the Contract Documents.

K. Final Photographs per Section 01 32 33 “Photographic Documentation.”

1.07 FINAL APPLICATION FOR PAYMENT REQUEST

A. Submit a preliminary final Application for Payment. This application is to include adjustments to the Contract Amount for:

1. Approved Change Orders.

2. Allowances not previously adjusted by Change Order.

3. Unit prices.

4. Deductions for defective Work that has been accepted by the Owner.

5. Penalties and bonuses.

6. Deductions for liquidated damages.

7. Deductions for reinspection payments per Paragraph 1.05.

8. Other adjustments.

B. Engineer shall prepare a final Change Order, reflecting the approved adjustments to the contract amount which have not been covered by previously approved Change Orders.

C. Submit the final Application for Payment per the General Conditions, including the final Change Order.

1.08 TRANSFER OF UTILITIES

A. Transfer utilities to the Owner when the Certificate of Substantial Completion has been issued, final cleaning has been completed per Section 01 74 23 “Final Cleaning,” and the Work has been occupied by the Owner.

B. Submit final meter readings for utilities and similar data as of the date the Owner occupied the Work.

1.09 WARRANTIES, BONDS, AND SERVICES AGREEMENTS

A. Provide warranties, bonds, and service agreements required by Section 01 33 00 “Document Management” or by the individual sections of the Specifications.

B. The date for the start of warranties, bonds, and service agreements is established per the General Conditions.

C. Compile warranties, bonds, and service agreements and review these documents for compliance with the Contract Documents.

1. Each document is to be signed by the respective Supplier or Subcontractor.

2. Each document is to include:
    a. The product or Work item description.
    b. The firm, with the name of the principal, address, and telephone number.
    c. Scope of warranty, bond or services agreement.
    d. Date, duration, and expiration date for each warranty bond and service agreement.
    e. Procedures to be followed in the event of a failure.
    f. Specific instances that might invalidate the warranty or bond.

D. Submit two copies of each document to the Engineer for review and transmittal to the Owner.
    1. Submit duplicate sets.
    2. Documents are to be submitted on 8-1/2 x 11 paper, punched for a standard three-ring binder.
    3. Submit each set in a commercial quality three-ring binder with a durable and cleanable plastic cover. The title “Warranties, Bonds, and Services Agreements”, the Project name and the name of the Contractor are to be typed and affixed to the cover.

E. Submit warranties, bonds and services agreements:
    1. At the time of final completion and before final payment.
    2. Within 10 days after inspection and acceptance for equipment or components placed in service during the progress of construction.

1.10 CLAIMS AND DISPUTES

A. Claims and disputes must be resolved prior to recommendations of final Application for Payment. Acceptance and final payment by the Contractor will indicate that any outstanding claims or disputed issues have been resolved to the full satisfaction of the Contractor.

2.00 PRODUCTS (NOT APPLICABLE)

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 73 29 CUTTING AND PATCHING

1.00 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements and limitations for cutting and patching of Work.

1.02 SUBMITTALS

A. Submit written request in advance of cutting or alteration, which affects:

1. Structural integrity of any element of Project.
2. Efficiency, maintenance, or safety of any operational element.
3. Visual qualities of sight exposed elements.
4. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Date and time Work will be executed.

2.00 PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01 33 00 “Document Management.”

3.00 EXECUTION

3.01 EXAMINATION

A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, inspect conditions affecting performance of Work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of the Project from damage.

3.03 CUTTING AND PATCHING

A. Execute cutting, fitting, and patching to complete Work.

B. Fit products together, to integrate with other Work.

C. Uncover Work to install ill-timed Work.

D. Remove and replace defective or non-conforming Work.

E. Provide openings in the Work for penetration of electrical Work.

F. Protect the structure and other parts of the Work and provide adequate support to maintain the structural integrity of the affected portions of the Work. Provide devices and methods to protect adjacent Work and other portions of the Project from damage. Provide protection from the weather for portions of the Project that may be exposed by cutting and patching Work.

G. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs.

H. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

I. Restore Work which has been cut or removed. Install new products to provide completed Work per the Contract Documents.

J. Patch finished surfaces and building components using new products specified for the original installation.

K. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to the nearest intersection.

2. For an assembly, refinish the entire unit.

3.04 PERFORMANCE

A. Execute Work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

B. Restore Work with new products in accordance with requirements of Contract Documents.

END OF SECTION

01 74 23 FINAL CLEANING

1.00 GENERAL

1.01 This section specifies administrative and procedural requirements for final cleaning at Substantial Completion.

1.02 WORK INCLUDED

A. Perform a thorough cleaning of the Site, buildings, or other structures prior to Owner occupancy of the buildings, and prior to Final Completion. Leave the Project clean and ready for occupancy.

1.03 SUBMITTALS

A. Provide data for maintenance per Section 01 78 23 “Operation and Maintenance Data.”

1.04 QUALITY CONTROL

A. Use experienced workmen or professional cleaners for final cleaning.

2.00 PRODUCTS

2.01 MATERIALS

A. Furnish the labor and products needed for cleaning and finishing as recommended by the Manufacturer of the surface material being cleaned.

B. Use cleaning products only on the surfaces recommended by the Supplier.

C. Use only those cleaning products which will not create hazards to health or property and which will not damage surfaces.

3.00 EXECUTION

3.01 FINAL CLEANING

A. Thoroughly clean the entire Site and make ready for occupancy.

1. Remove construction debris, boxes, and trash from the Site.
2. Remove construction storage sheds and field offices.
3. Restore grade to match surrounding condition and remove excess dirt.
4. Sweep all drives and parking lots clean of dirt and debris. Use water truck or hose down paved site to like new appearance.

B. Clean floors and inspect for damage.

1. Remove oil, grease, paint drippings, and other contaminants from floors, then mop repeatedly until thoroughly clean. Replace damaged flooring.

2. Clean resilient flooring with an approved cleaner and provide one coat liquid floor polish as recommended by the flooring Supplier. Polish to a buffed appearance with powered floor buffer.

3. Vacuum all carpets with powered floor sweeper to remove dirt and dust. Remove glue or other substances from nap of carpet.

C. Clean and polish inside and outside glass surfaces. Wash with window cleaner and water, apply a coat of high quality glass polish and wipe clean. Do not scratch or otherwise mar glass surfaces.

D. Clean wall surfaces to remove dirt or scuff marks. Remove excess adhesive along top edges of wall base. Remove adhesive from surfaces of vinyl wall coverings.

E. Align tile to fit properly in grid and replace cracked or damaged tile. Remove smear marks and other dirt from tile and clean surface of grid system.

F. Spot paint nicks and other damage. If spot-painting does not blend into the existing color and texture of the surrounding surfaces, repaint wall from inside corner to inside corner. Touch up damaged surfaces on factory finished equipment using special paint furnished by the Manufacturer.

G. Clean plumbing fixtures, valves, and trim. Clean toilet seats and covers. Remove labels and adhesive from fixtures. Remove floor drains and clean baskets or buckets. Polish strainers and exposed chrome or brass.

H. Remove dirt, oil, grease, dust and other contaminants from floors, equipment and apparatus in mechanical and electrical rooms with vacuum.

I. Clean and polish ceramic tile floors and wall surfaces to remove mildew or other stains. Tuck point defective joints.

J. Inspect exterior painted surfaces. Spot paint any damaged surfaces.

K. Clean permanent filters and replace disposable filters on heating, ventilating, and air conditioning systems. Clean ducts, blowers, and coils if units were operated without filters during construction.

L. Clean roof areas of debris; flush roof drainage systems with water until clear.

M. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

N. Clean and polish all electrical equipment and exposed conduits. Remove paint overspray. Provide a blemish free appearance on all exposed equipment and conduits.

END OF SECTION

01 75 00 STARTING AND ADJUSTING

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide step-by-step procedures for starting provided systems, including equipment, pumps and processes.

B. Provide pre-start up inspections by equipment manufacturers.

C. Provide instruction and demonstration of operation, adjustment, and maintenance of each system and the component parts.

D. Place each system in service and operate the system to prove performance and to provide for initial correction of defects in workmanship, calibration, and operation.

E. Provide for initial maintenance and operation.

F. Cost for Starting and Adjusting provided by Suppliers and Subcontractors as described in this section are to be included in the Cost of Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 “Document Management,” and shall include:

1. A Plan of Action for testing, checking, and starting major equipment and process piping systems. Submit reports as required by this specification.

2. Equipment Installation Reports on the form provided by the Engineer per Section 01 33 00 “Submittal Procedures.”

3. Operation and Maintenance Manuals per Section 01 78 23 “Operation and Maintenance Data.”

1.03 STANDARDS

A. Comply with any standards associated with the testing or start up of equipment, as listed in the various sections of the Specifications.

1.04 SPECIAL JOB CONDITIONS

A. Do not start or test any apparatus until the complete unit has been installed and thoroughly checked.

B. A representative of the Supplier shall be in attendance of tests and start-up procedures when required by these Specifications.

2.00 PRODUCTS

2.01 TESTING INSTRUMENTATION

A. Furnish any instrumentation or other testing devices needed to conduct tests.

3.00 EXECUTION

3.01 SERVICES OF SUPPLIER'S REPRESENTATIVES

A. The Supplier's representative for inspection, supervision of installation, and training must be an experienced and competent technical (not sales) representative of the manufacturer or Supplier.

B. Perform installation, adjustment, and testing of the equipment under the direct supervision of the Supplier's representative where specified.

C. The Supplier's representative is to instruct the Owner or his authorized personnel on operational procedures and maintenance requirements.

D. Include the cost of the services of the Supplier's representative in the equipment price.

3.02 INSPECTION AND START UP

A. Inspect equipment prior to placing any equipment or system into operation. Make adjustments as necessary for proper operation.

1. Check for adequate and proper lubrication.
2. Determine that parts or components are free from undue stress from structural members, piping or anchorage.
3. Adjust equipment for proper balance and operations.
4. Determine that vibrations are within acceptable limits.
5. Determine that equipment operates properly under full load conditions.
6. Determine that the equipment is in true alignment.

B. Have the Supplier's representative present when the equipment is placed in operation.

1. The Representative is to be on-site as often as necessary for proper and trouble free operation.
2. Ensure that the proper procedure is employed in start up of systems.

C. Provide Equipment Installation Reports for Equipment on the form indicated by Engineer.

1. Certify that the equipment and related appurtenances have been thoroughly examined and approved for start-up and operation.
2. Include the date when Owner's personnel were instructed in the proper operation and maintenance of the equipment in the report.

3.03 STARTING REQUIREMENTS

A. Refer to the individual sections of the specifications for specific start up procedures.

3.04 INITIAL OPERATION

A. Start, test, and place equipment and systems into operation for 30 days to allow the Owner and Engineer to observe the operation and overall performance of the equipment and to determine that controls function as intended.

B. Equipment which operates on a limited or part-time basis shall be operated in the presence of the Engineer to demonstrate that controls function as specified.

C. Perform acceptance test as specified in individual specification sections. Demonstrate that equipment and systems meet the specified performance criteria.

D. Unless specifically stated otherwise in the individual equipment specifications, equipment and systems are not substantially complete until the end of this initial operation period. If an exception to this requirement is specifically noted in an individual equipment specification, the exception shall only apply to that particular piece of equipment and not to the remaining components provided under the Project.

3.05 OPERATOR TRAINING

A. Provide instruction and demonstration of the care and operation of the equipment to the Owner's personnel. Instruction is to include classroom and hands-on training.

B. Provide training in adequate detail to ensure that the trainees who complete the program will be qualified and capable of operating and maintaining the equipment, products, and systems provided.

C. Operations Training is to include but not be limited to:

1. Orientation to provide an overview of system/subsystem configuration and operation.
2. Terminology, nomenclature, and display symbols.
3. Operations theory.
4. Equipment appearance, functions, concepts, and operation.
5. Operating modes, practices and procedures under normal, diminished, and emergency conditions.
6. Start-up and shutdown procedures.
7. Safety Precautions.
8. On-the-job operating experience for monitoring functions, supervisory, or command activities. Include functions and activities associated with diminished operating modes, failure recognition, and responses to system/subsystem and recovery procedures.
9. Content and use of Operation and Maintenance manuals and related reference materials.

D. Provide training for performing on-site routine, preventive, and remedial maintenance of the equipment, product, or system. Maintenance training is to include but not be limited to:

1. Orientation to provide an overview of system/subsystem concept, configuration, and operation.
2. Operations theory and interfaces.
3. Instructions necessary to ensure a basic theoretical and practical understanding of equipment appearance, layout and functions.
4. Safety precautions.

5. Use of standard and special tools and test equipment.
6. Adjustment, calibration, and use of related test equipment.
7. Detailed preventive maintenance activities.
8. Troubleshooting, diagnostics, and testing.
9. Equipment assembly and disassembly.
10. Repair and parts replacement.
11. Parts ordering practices and storage.
12. Failure and recovery procedures.
13. Cabling and/or interface connectors.
14. Content and use of Operation and Maintenance manuals and related reference materials.
15. Procedures for warranty repairs.
16. Lubrication.
17. Procedures, practices, documentation, and materials required to commence system maintenance.

E. Provide a training plan that indicates the schedule and sequence of the training programs. The training plan is to include for each course:
   1. Number of hours for the course.
   2. Agenda and narrative description, including the defined objectives for each lesson.
   3. Draft copy of training handbooks.
   4. A descriptive listing of suggested reference publications.
   5. Audio-visual equipment required for training.
   6. Type and number of tools or test equipment required for each training session.

F. Provide and use training aids to complement the instruction and enhance learning.
   1. Provide training handbooks for use in both the classroom and the hands-on phases of training for each course.
   2. Instructional materials shall include references to the Operation and Maintenance Manuals and identify and explain the use of the manual.
   3. Provide a copy of all audio/visual training materials used in the presentations.

G. Provide qualified instructors to conduct the training.
   1. Instructors must have knowledge of the theory of operation and practical experience with the equipment, product, or system.
   2. Instructors must have successfully conducted similar training courses.

H. Training may be recorded by the Owner or its consultants for use in future training. Provide legal releases or pay additional fees required to allow training by the manufacturer to be recorded.

I. Schedule for training is to be approved by Owner.

1. Schedule training and start-up operations for no more than one piece of equipment or system at a time.
2. Owner may require re-scheduling of training if operations personnel are not available for training on a scheduled date.
3. Provide a minimum of 2 weeks' notice if training must be rescheduled.
4. Training is to be limited to 24 hours per week.
5. Time required for training is to be considered in the development of the Project schedule.

J. Schedule and coordinate training for equipment, products, or systems which depend upon other equipment or systems for proper operation so that trainees can be made familiar with the operation and maintenance of the entire operating system.

K. Conduct a training course for the equipment products and systems provided for the Project. Training is to be adequate to meet the training objectives described above. Details for training will be established in the project specifications for that equipment. Cost for training and start up will be included in the Cost of Work for each equipment package.

3.06 INITIAL MAINTENANCE

A. Maintain equipment until the Project is accepted by the Owner.

1. Insure that mechanical equipment is properly greased, oiled, or otherwise cared for as recommended by the Supplier.
2. Operate air handling equipment only when filters are in place and are clean. Change filters weekly during construction.

B. Service equipment per the Supplier's instructions immediately before releasing the equipment to the Owner.

1. Replace replaceable filters and clean permanent filters associated with air handling units or other packaged equipment.
2. Remove and clean screens at strainers in piping systems.
3. Clean insects from intake louver screens.

END OF SECTION

01 78 23 OPERATION AND MAINTENANCE DATA

1.00 GENERAL

1.01 WORK INCLUDED

A. Prepare a complete and detailed Operation and Maintenance Manual for each type and model of equipment or product furnished and installed under this Contract.

B. Prepare the manuals in the form of an instruction manual for the Owner. The manual is to be suitable for use in providing operation and maintenance instruction as required by Section 01 75 00 "Starting and Adjusting."

C. Provide complete and detailed information specifically for the products or systems provided for this Project. Include the information required to operate and maintain the product or system.

D. Manuals are to be in addition to any information packed with or attached to the product when delivered. This information is to be taken from the product and provided as an attachment to the manual.

E. Cost for O&M Manuals provided by Suppliers and Subcontractors as described in this section are to be included in the Cost of Work. Contractor efforts are included in the Contractor's fee for Construction Phase Services.

1.02 SUBMITTALS

A. Submit manuals in accordance with Section 01 33 00 "Submittal Procedures." Attach to each manual a copy of the Operation and Maintenance Manual Review Form with pertinent information completed.

1.03 DOCUMENTATION

A. Submit manuals in accordance with Section 01 33 00 "Document Management." Attach a copy of the Operation and Maintenance Manual Review Report form provided by the Construction Manager to each manual with pertinent information completed.

B. Provide one preliminary electronic copy of the manual to the Construction Manager for review within 15 days after review of any equipment submittal by the OPT.

C. Provide one electronic copy and three printed copies of the final manual after:

1. Preliminary manuals have been approved;

2. Field test records have been incorporated into the manual; and

3. Record Documents per Section 01 31 13 "Project Coordination" have been approved and have been incorporated in the final manual.

D. Provide copies of the manufacturer's warranties, guarantees, or service agreements in accordance with Section 01 70 00 "Execution and Closeout Requirements."

1.04 GUARANTEES

A. Provide copies of the Manufacturer's warranties, guarantees, or service agreements in accordance with Section 01 70 00 "Execution and Closeout Requirements."

2.00 PRODUCTS

2.01 MATERIALS

A. Provide digital files for each manual as specified in Paragraph 2.02.

1. Use filenames that correspond to the equipment designation shown in the Contract Documents or other equipment designations provided by the OPT.

2. Submit a preliminary version of the electronic manual for review. Provide a final version of the manual incorporating OPT's comments.

B. Provide printed copies of each manual as specified in Paragraph 2.03.

2.02 ELECTRONIC MANUAL FORMAT

A. Manual contents are to be submitted in electronic format to the Construction Manager.

B. Provide individual electronic files for each manual.

1. Maximum file size is 75 MB. If manual is greater than maximum allowable file size, provide individual files for each major section of manual.

2. Acceptable file types for written documents are Portable Document File (PDF) or provide manual text in Microsoft Word. Provide drawings in native format and PDF format. All files must be compatible with the latest software version available.

3. Filename must identify the equipment location, equipment manufacturer, and date equipment placed in service, e.g. JCC1-Pump Room-Manufacturer-200503.pdf.

4. Each electronic file must contain a table of contents at the beginning of the file which includes hypertext links or bookmarks to navigate the file contents per section/chapter.

5. Scanned images of written documents are not acceptable. Document must allow character selection. Text within a file must be transferable to other documents.

6. Drawing files must have the ability to turn on/off drawing layers within the file.

2.03 PRINTED MANUAL FORMAT

A. Printed copies of each manual are to be submitted as follows:

1. Print manuals on heavy, first quality 8-1/2 x 11 paper.

a. Reduce drawings and diagrams to 8-1/2 x 11 paper size.

b. When reduction is not practical, fold drawings and place each separately in a clear, super heavy weight, top loading polypropylene sheet protector designed for three-ring binder use. Provide a typed identification label on each sheet protector.

c. Punch paper for standard three-ring binders.

2. Place manuals in heavy duty presentation, d-ring binders with clear front, back, and spine covers.
3. Identify each manual by placing a printed cover sheet in the front cover of the binder and as the first page in the manual. The first page is to be placed in a clear polypropylene sheet protector. The information on first page and the cover page are to include:
    a. Name of Owner;
    b. Project name;
    c. Volume number; and
    d. Table of contents.
4. Insert the name of the Project and volume number into the spine covers.
5. Sheet lifters are to be provided.
6. Minimum size is 2-inch capacity. Maximum size is 3-inch capacity. Fill binders to only three-fourths of its indicated capacity to allow for addition of materials to each binder by the Owner.
7. Provide index tabs for each section of the manual. Indexes are to be constructed of heavy-duty paper with a reinforced binding edge. The designation on each index tab is to correspond to the number and letter assigned in the Table of Contents.
8. Manuals for several products or systems may be provided in the same binder. Correlate the data into related groups when multiple products or systems are included in the same binder.
    a. Sections for each product or system must be included in the same binder.
    b. Sections must be in numerical order from volume to volume.

3.00 EXECUTION

3.01 MANUAL ORGANIZATION AND CONTENTS

A. Provide a table of contents listing each section of the manual for each product or system.
    1. Assign a number and letter to each section in the manual.
        a. The number is to correspond to the Owner's equipment numbering system or other system designated in the Contract Documents.
        b. The letter assigned will represent the part of the manual, consistent with the manual contents as required by this Section.
    2. Identify each product or system using the nomenclature shown in the Contract Documents. Provide a cross reference to the Owner's numbering system and designations for equipment indicated in the Contract Documents if these are different.
B. Include only the information that pertains to the product described. Annotate each sheet to:
    1. Clearly identify the specific product or component installed;
    2. Clearly identify the data applicable to the installation; and

3. Delete or strike through references to inapplicable information.

C. Supplement manual information with drawings as necessary to clearly illustrate relations of component parts of equipment and systems, and control and flow diagrams.

D. Manuals for several products or systems may be provided in the same binder.

E. Fill binders to only three-fourths of its indicated capacity to allow for addition of information by the Owner.

3.02 EQUIPMENT AND SYSTEMS MANUAL CONTENT

A. Provide the following information in the first tabbed section of each manual:

1. A description of the unit and component parts and how it functions.

2. Operating instructions for pre-startup, startup, normal operations, regulation, control, shutdown, emergency conditions, and limiting operating conditions.

3. The sequence of operation by the controls manufacturer. Provide control diagrams by the manufacturer, modified to reflect the as-built, as-installed condition.

4. Include general assembly contract drawings, sections, and photographic views as necessary to completely depict and properly identify the equipment. Indicate the dimensions, weight, capacity, and design conditions for the equipment.

B. Include detailed information to allow for the proper installation, calibration, testing, preventative, and corrective maintenance procedures in the second section of the manual or of each section of the manual information if the manual covers a multi-component equipment system. This information should include the following:

1. Maintenance instructions including assembly, installation, alignment, clearances, tolerances, and interfacing equipment requirements, adjustment, and checking instructions. Include any special rigging required to place the equipment into place, and any special test equipment required to place the equipment in service.

2. A safety subsection which addresses all safety and tag-out procedures necessary to safely operate and maintain the equipment.

3. Lubrication schedule and lubrication procedures. Include a cross reference for recommended lubrication products.

4. Troubleshooting guide.

5. A table showing the schedule of routine maintenance requirements and seasonal work which is not performed at a set frequency. Preventative maintenance tasking must address:

a. Daily/weekly inspections performed by operations personnel;

b. Routine preventative maintenance scheduled weekly, monthly, quarterly, semi-annually, or annually through major overhauls by maintenance personnel; and

c. Predictive maintenance work such as alignment, analysis of the equipment, vibration, flow, oil sampling, etc.

6. Description of sequence of operation by the control manufacturer.

7. Warnings for detrimental maintenance practices.
8. Detailed corrective maintenance procedures including:
    a. Detail equipment for complete disassembly and assembly;
    b. Cross-sectional drawings or exploded views with all parts numbered to correspond with the numbers in the parts list to permit identification of the various parts;
    c. A table of normal clearances, diameters, thickness of new parts, and limits permissible for wearing parts; and
    d. List torque settings for nuts, bolts, and fasteners when critical to the equipment's performance.

C. Include all necessary diagrammatic piping and wiring diagrams and miscellaneous contract drawings and equipment in the third section of the manual or of each section of the manual if the manual covers a multi-component equipment system.

D. Provide spare parts information in the fourth section of the manual including:
1. Part numbers for ordering new parts;
2. Assembly illustrations showing an exploded view of the complex parts of the product;
3. Predicted life of parts subject to wear;
4. List of the manufacturer's recommended spare parts, current prices with effective date, and number of parts recommended for storage;
5. Directory of a local source of supply for parts with company name, address, and telephone number;
6. Complete nomenclature and list of commercial replacement parts; and
7. Complete list of spare parts, spare equipment, tools, and materials that are turned over to the Owner.

E. Provide statistical information from the original equipment manufacturer as to performance such as pump curves, flow charts insulation resistance, calibration, or test data sheets in the fifth section of the manual, including all field testing records used to verify actual performance.

F. Provide equipment name plate data installed on equipment and valves and equipment data sheets as required and furnished by the Owner in the sixth section of the manual.

G. Provide a copy of warranties and the date the warranty expires for equipment in the seventh section of the manual.

3.03 ELECTRICAL AND ELECTRONICS SYSTEMS MANUAL

A. Provide all of the information listed in Paragraph 3.02 as appropriate and include the following information:
1. Control schematics and point to point wiring diagrams prepared for field installation;
2. Circuit directories of panel boards and terminal strips and as installed color coded wiring diagrams; and

3. Other information as may be required by the individual Specification Sections.

3.04 ARCHITECTURAL PRODUCTS MANUAL

A. Provide the following information:

1. Information required for ordering replacement products;
2. Instructions for care and maintenance;
3. List of the manufacturer's recommended lubricants;
4. The manufacturer's recommendations for types of cleaning agents and methods;
5. Cautions against cleaning agents and methods that are detrimental to the product; and
6. Recommended maintenance and cleaning schedule.

B. Final balancing reports for mechanical systems.

C. Other information as may be required by the individual Specification Sections.

3.05 LIST OF SERVICE ORGANIZATIONS

A. Provide a directory of authorized service organizations with company name, address, telephone number, email address, and the contact person for warranty repair.

END OF SECTION

DIVISION 05

METALS

05 50 00 METAL FABRICATIONS

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Steel framing for fuel tank support.

1.03 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code - Steel.”

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, “Structural Welding Code - Steel.”

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

B. Do not submit shop drawings or fabricate or construction the steel platform until the existing construction and existing reinforcing bar locations have been confirmed.

2.00 PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. All steel framing and fasteners shall be hot-dip galvanized unless noted otherwise.

2.02 FERROUS METALS

A. As indicated.

2.03 FASTENERS AND ANCHORS

A. General: Provide galvanized fasteners

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM F3125, grade as indicated; with hex nuts, ASTM A563, Grade C3 (ASTM A563M, Class 8S3); and, where indicated, flat washers.

C. Anchor Rods: ASTM F1554, grade as indicated, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

2.04 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: ZRC World Galvilite galvanizing repair compound.

2.05 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2. Double angles shall have intermediate connectors according to AISC Steel Construction Manual. Unless otherwise noted, connectors shall be bolted.

3.00 EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

D. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.02 FIELD QUALITY CONTROL

A. Bolted Connections: Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using High-Strength Bolts."

3.03 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780, manufacturer recommendations, and a minimum of two (2) 1.5mil DFT coats.

END OF SECTION

DIVISION 09

FINISHES

09 91 00 PAINTING

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior and interior substrates.
   1. Concrete.
   2. Cement board.
   3. Fiber-cement board.
   4. Concrete masonry units (CMUs).
   5. Steel and iron.
   6. Galvanized metal.
   7. Aluminum (not anodized or otherwise coated).
   8. Wood.
   9. Fiberglass.
   10. Plastic.
   11. Gypsum board.
   12. Portland cement plaster (stucco).
   13. Plaster.
   14. Cotton or canvas insulation covering.
   15. ASJ insulation covering.
   16. Bituminous-coated surfaces.

B. Related Requirements:
   1. Section 05 50 00 “Metal Fabrications” for shop priming metal fabrications.

1.03 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.

2. Apply coats on Samples in steps to show each coat required for system.

3. Label each coat of each Sample.

4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5\ percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.06 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.08 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

2.00 PRODUCTS

2.01 MANUFACTURERS

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

1. Behr Process Corporation.

2. Benjamin Moore & Co.

3. Coronado Paint; Benjamin Moore Company.

4. Dulux (formerly ICI Paints); a brand of AkzoNobel.

5. Glidden Professional.

6. Kelly-Moore Paint Company Inc.

7. PPG Architectural Finishes, Inc.

8. Pratt & Lambert.

9. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide one of the products\ listed in the Interior Painting Schedule for the paint category indicated.

2.02 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated in finish schedule.

2.03 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.

2. Fiber-Cement Board: 12 percent.

3. Masonry (Clay and CMUs): 12 percent.

4. Wood: 15 percent.

5. Gypsum Board: 12 percent.

6. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer. But not less than the following:

1. SSPC-SP 2.

2. SSPC-SP 3.

3. SSPC-SP 7/NACE No. 4.

4. SSPC-SP 11.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.

c. Pipe hangers and supports.

d. Metal conduit.

e. Plastic conduit.

f. Tanks that do not have factory-applied final finishes.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.

b. Uninsulated metal piping.

c. Uninsulated plastic piping.

d. Pipe hangers and supports.

e. Metal conduit.

f. Plastic conduit.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Water-Based Light Industrial Coating System MPI INT 3.1L:

a. Prime Coat: Primer, alkali resistant, water based, MPI #3.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.

c. Topcoat: Light industrial coating, interior, water based (MPI Gloss Level 3), MPI #151.

B. CMU Substrates:

1. Latex System MPI INT 4.2A:

a. Block Filler: Block filler, latex, interior/exterio , MPI #4.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.

C. Steel Substrates:

1. Latex System, Alkyd Primer MPI INT 5.1Q:

a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.

D. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System MPI INT 5.3N:

a. Prime Coat: Primer, galvanized, water based, MPI #134.

b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

E. Wood Substrates: Wood trim and wood board paneling.

1. Latex over Latex Primer System MPI INT 6.3T:

a. Prime Coat: Primer, latex, for interior wood, MPI #39.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #4.

F. Gypsum Board Substrates:

1. Latex over Latex Sealer System MPI INT 9.2A:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.

b. Prime Coat: Latex, interior, matching topcoat.

c. Intermediate Coat: Latex, interior, matching topcoat.

d. Topcoat: Latex, interior (MPI Gloss Level 2) [, MPI #44].

3.07 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Quick-Dry Enamel System MPI EXT 5.1A:

a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.

b. Intermediate Coat: Alkyd, quick dry, matching topcoat.

c. Topcoat: Alkyd, quick dry, semi-gloss (MPI Gloss Level 5), MPI #81.

d. Topcoat: Alkyd, quick dry, gloss (MPI Gloss Level 7), MPI #96.

B. Galvanized-Metal Substrates:

1. Latex System MPI EXT 5.3H:

a. Prime Coat: Primer, galvanized, water based, MPI #134.

b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

d. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

e. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6), MPI #119.

C. Painted Metal Substrates

1. Surface preparation:

a. SSPC-SP2 – Hand Tool Cleaning

b. SSPC-SP1 – Solvent Cleaning

c. SSPC-SP3 Power tool clean spot areas where required

d. Spot Prime: One coat of Carbomastic 15 @ 3.0-5.0 mils DFT

e. Primer: One coat of Rustbond applied @ 1.5-2.0 mils DFT

f. Stripe coat: One coat of Rustbond applied @ 1.5-2.0 mils DFT

g. Over-coat: One coat of Carbothane 133HB applied @ 3.0-5.0 mils. DFT Minimum: 6.0 mils, DFT Maximum: 10.0 mils DFT”

END OF SECTION

DIVISION 26

ELECTRICAL

26 01 26 TESTING OF ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, material, equipment and incidentals of an independent testing agency. Testing shall be inclusive of all medium voltage and low voltage equipment including conductors for the project. Testing shall include all breaker and relay protective schemes and operation of the medium and low voltage equipment.

1.02 QUALITY ASSURANCE

A. Independent testing agency shall follow all tests and recommendations in NETA Acceptance Testing Specification for all equipment provided.

B. Acceptable Testing Agencies:

1. National Field Services
2. Real Power Technologies
3. Shermco Industries
4. No others shall be accepted

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. ELECTRICAL QUALIFICATIONS & LIST OF TEST SUBMITTAL

a. 60 days prior to any testing taking place, Contractor shall submit to the Owner/Engineer the name of the testing agency; a list of all tests to be conducted shall also be submitted at this same time. No testing shall take place until this has been submitted and approved by the Engineer.

2. ELECTRICAL TESTING PLAN

a. A minimum of two (2) weeks before testing is to take place, Contractor shall submit a detailed testing plan of the different configurations to be tested for the Owner’s and Engineer’s approval.

3. ELECTRICAL TESTING REPORT

a. A written report shall be submitted by the testing agency performing installation checks, operation, and testing of the medium and low voltage equipment. This report shall certify that

1). The equipment has been properly installed,

2). Is in accurate alignment, and

3). Meets the acceptance testing specifications of NETA and the equipment manufacturer.

4). Provide a detailed list of all tests that were performed and the test results as part of the Electrical Testing Report.

5). Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

6). Provide a detailed list of megger results for low voltage cables. List should include circuit tag as shown on the contract documents, voltage, phase and cycle identification, phase-to-phase result for each combination of phases, phase-to-neutral result for each combination of phase and phase-to-ground result for each combination of phases. List should also include person's witnessing and performing tests.

7). Infrared test results shall include the following for each item tested:

a). A description of the equipment tested noting specific equipment tag number and compartment if applicable.

b). The load (in amps) and operating conditions at which the equipment was running and other testing conditions that may affect the IR results

c). A thermal image noting temperatures alongside a standard photograph. An image shall be included for each thermal image taken for the project.

d). Where issues are identified by thermal image, provide a photograph with annotation indicating where problems are detected.

e). A description of any problems detected

f). Information on the camera listing model number, processor type, date of last calibration, resolution, etc.

b. Electrical Testing Report shall be submitted to the ENGINEER for approval at least four (4) weeks before start-up and training and no later than four weeks after testing has been conducted. The Contractor shall not be allowed to wait for the final test to be performed to submit a single testing report. Individual test reports may be submitted to maintain the maximum of four weeks after test has been performed.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

1. American National Standards Institute (ANSI)
2. American Standards for Testing and Materials (ASTM)
3. Institute of Electrical and Electronic Engineers (IEEE)
4. National Electrical Manufacturers Association (NEMA)
5. International Electrical Testing Association (NETA)

1.05 RELATED SPECIFICATIONS

A. All testing referenced in the following Specifications shall be submitted under this section:

1. 26 05 19, “Low Voltage Electrical Conductors & Cables”
2. 26 05 26, “Grounding & Bonding for Electrical Systems”
3. 26 22 13, “Low Voltage Distribution Transformers”
4. 26 24 16.02, “Lighting and Branch Panelboards”
5. 26 32 13, “Engine Generators”
6. 26 36 00, “Transfer Switches”

2.00 PRODUCTS [NOT USED]

3.00 EXECUTION

3.01 GENERAL

A. Perform all testing identified in the latest edition of NETA Standard for Accepting Testing Specifications.

B. All testing shall be witnessed by the Owner’s Representative. Types of equipment required to be tested by these specifications shall include but not be limited to the following:

1. The following tests shall be conducted by the Contractor:

a. Cables

1). Low Voltage Cables.

a). Insulation - resistance test

b). Perform resistance measurements through all connections with a low resistance ohmmeter.

c). Perform Continuity test to insure correct cable connection. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

d). Perform each visual and mechanical inspection and electrical tests stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

e). Perform all tests as specified in NETA Acceptance Testing Specifications.

f). Perform a thermographic survey of all connections under full load conditions.

(1). Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each termination for cables and conductors No.3 AWG and larger. Remove box and equipment covers so terminations are accessible to portable scanner.

(a). Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each termination 11 months after date of Substantial Completion.

(b). Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

(c). Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action. An actual photograph of the infrared scan shall accompany the report.

g). Remove and replace malfunctioning units and retest as specified above.

b. Low Voltage Equipment

a). Test in accordance with NETA Acceptance Testing Specifications.

c. Grounding.

1). Use Biddle Direct Reading Earth Resistance Tester or equivalent to measure resistance to ground of the system. Perform testing in accordance with the test instrument manufacturer's recommendation using the fall of potential method.

2). Resistance to ground testing shall be performed during dry season. Submit test results in the form of a graph showing the number of points measured (12 minimum) and the numerical resistance to ground.

3). Testing shall be performed before energizing the distribution system.

4). A separate test shall be conducted for each building or system.

5). Notify the ENGINEER immediately if the resistance to ground for any building or system is greater than five ohms. Provide additional ground rods and conductors as required to bring the resistance to five ohms.

6). Submit reports of all tests to the Owner/Engineer.

C. All testing shall be in accordance with the manufacturer's recommendations for energization and start-up of the equipment.

D. Testing shall include a complete functionality testing of electrical equipment under all the different operating parameters identified by the OWNER and ENGINEER.

E. Ground Resistance Test

1. Visual and Mechanical Inspection.

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

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

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

1). 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.

2). 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.

d. Inspect anchorage

2. Electrical Tests

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

b. 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 ohm. Compare equipment nameplate data with Contract Documents.

c. Inspect physical and mechanical condition.

F. Remove and replace defective units and retest.

G. Prepare test and inspection reports.

END OF SECTION

26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary for complete and operational electrical systems, as specified herein.

B. This Section, as well as Division 1, concerns all other Sections in Division 26, and shall be considered a part of each of those Sections as if written in their entirety.

1.02 QUALITY ASSURANCE

A. ELECTRICAL CONTRACTORS' QUALIFICATIONS

1. Use adequate numbers of skilled workmen, trained and experienced in their crafts, and who are familiar with the specifications and methods of performing the work in this Division. A licensed Journeyman shall be always on site when electrical work is being performed. Electrical work shall be performed under the direct supervision of a Master Electrician who holds a valid license in the Parish where the work is being performed. The CONTRACTOR shall provide a monthly report to the OWNER/ENGINEER for review stating that the Master Electrician has been to the job site and thoroughly reviewed the work**. THE REPORT SHALL BE SIGNED BY THE MASTER ELECTRICIAN AND INCLUDE THE DATE AND TIME THE MASTER ELECTRICIAN WAS ON SITE. THE REPORT SHALL BE INCLUDED IN THE PAY APPLICATION. NO PAYMENT WILL BE GRANTED WITHOUT REPORT.**

B. WORKMANSHIP

1. Work shall be performed in accordance with quality, commercial practices. The appearance of finished work shall be of equal importance with its operation. Materials and equipment shall be installed based upon the actual dimensions and conditions at the project site. Locations for materials or equipment requiring an exact fit shall be field measured. Conduit, transformers, and motors shall be isolated to avoid unacceptable noise levels from objectionable vibrations from all systems.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management”, and shall include:

1. Component catalog number and manufacturing data sheet, indicating pertinent data and clearly marked identifying each component by the item number and nomenclature as specified.

2. Submit copy of Master Electrician’s license and each Journeyman’s license that will be working on the project. Workers must be licensed to work in the Parish where the project is located.

3. Component drawings showing dimensions, mounting, and external connection details.

4. Complete interconnection and point to point wiring diagrams in AutoCAD format for all field control and instrumentation wiring between instruments, electrical equipment,

starters, control panels, etc. A hard copy shall be submitted to the ENGINEER for approval prior to the final AutoCAD files being submitted. Interconnection/wiring diagrams shall include cable numbers, wire tags, actual equipment terminal strip numbers at both ends of the cable, etc. and be project specific.

5. Operation and maintenance manuals shall contain the approved shop drawings, submittals, spare part lists, schematics, final wiring diagrams with any changes made during start-up and maintenance procedures.
6. Contractor shall provide a detail project specific sequence of operations manual on the operation of the electrical distribution system at the Spillway. This includes operation in the following modes:
    - Normal utility mode
    - Emergency Mode – permanent 60kW generator
    - Emergency Mode – portable generator connected at the Spillway Service Entrance manual transfer switch
    - Emergency bypass circuit operation mode

    Sequence of operations manual shall clearly explain a step by step procedure for mode listed above and kirk-key sequence of operations where applicable. Project specific one-line diagrams shall be provided for each mode of operation. Contractor shall also provide a 4-hour training class on all modes of operations and walk the Owner through all the different modes. Contractor shall coordinate with Owner for all training dates and times and provide a minimum 2 weeks' notice. A training agenda along with the sequence of operations manual shall be provided to the Owner/Engineer for review and comment prior to the training taking place.
7. Unless other additional information is required by the detailed equipment specifications, the following information shall be included for motors:
    a. Motor identification number and nomenclature as specified
    b. Make and motor type
    c. Brake horsepower of the motor
    d. Locked rotor current at full load
    e. Motor efficiency at full load (3-phase motors only)
    f. Starting torque
    g. Method of insulating and impregnating motor coils (3-phase only)
    h. Speed of the motor at full torque
    i. Full load current
    j. Service factor
    k. Motor temperature rise measured by resistance over 40 degrees C ambient

B. The CONTRACTOR shall provide a monthly report to the OWNER/ENGINEER for review stating that the Master Electrician has been to the job site and thoroughly reviewed the

work. The report shall be signed by the Master Electrician and include the date and time the Master Electrician was on site.

C. The CONTRACTOR shall submit a copy of the Master Electrician's license and Journeyman's license who will be working on the project. This information shall be submitted as a formal submittal prior to beginning any work.

D. The CONTRACTOR shall:

1. Prepare, and keep up to date, the Record Drawings and detailed construction drawings which shall be available at each monthly pay application.

2. Record the exact locations of each of these differences, sizes and details of the Construction Work as executed, with cross-references to and other requirements on the Record Drawings.

    a. Record Drawings shall include the location of all pull boxes, junction boxes, concrete pull boxes, manholes and hand holes that were provided under this contract and those existing boxes that were modified under this project (by either the addition or removal of cable/conduits).

        1). The Contractor shall also include on the drawings a label next to each pull box, junction box, concrete pull box, manhole and handhole to reflect the nameplate label installed (existing or new) at each device.

        2). Refer to Section 26 05 53, "Identification for Electrical Systems" for labeling requirements for pull boxes, junction boxes, concrete pull boxes, manholes and hand holes.

3. Keep the Record Drawings on the Work Site;

4. Upon completion of the Work, or at such other time as may be determined by the ENGINEER, submit the Record Drawings and copies to the OWNER's Representative in accordance with the OWNER's Requirements.

5. Underground Interference drawing showing all underground duct banks, ground rods, ground conductors, pipes, piers, vaults, manholes, pull boxes, etc. that clearly identifies the location and routing of these systems. All interferences shall be brought to the ENGINEER's attention. Provide as a minimum the duct bank dimensions, burial depth and coordinates of terminations and those of any changes of direction. The GPS coordinates of the duct bank shall be measured (width, depth, and burial depths) prior to back filling.

6. Provide revised final shop drawings in AutoCAD format noting any changes made to equipment during start-up.

7. Submit master electricians report with each pay application as specified in paragraph 1.02.A. of this specification.

E. The CONTRACTOR shall provide a wall mounted copy of the complete one-line diagram in the Spillway Control room. The wall mounted one-line shall be as follows:

1. The one-line shall reflect all changes made including but not limited to changes made during construction.

2. The copy shall be framed in a picture frame with plexiglass. The copy of the sheet shall lay flat against the plexiglass without any wrinkles and other material necessary for the copy to lay flat shall be provided within the picture frame.
3. Each page of the one-line shall be framed in a separate picture frame with plexiglass. The copy of the sheet shall lay flat against the glass without any wrinkles and other material necessary for the copy to lay flat shall be provided within the picture frame.

1.04 STANDARDS

A. Electrical work shall be executed in accordance with local, State and national codes, ordinances and regulations which have jurisdiction or authority over the work. If the standards and codes conflict with each other, the most stringent shall apply. The applicable provisions of the following standard shall apply as if written here in their entirety:
   1. National Electrical Manufacturer Association (NEMA)
   2. American Society for Testing and Materials (ASTM)
   3. National Fire Protection Association (NFPA)
   4. National Electrical Safety Code (NESC)
   5. Institute of Electrical and Electronic Engineers (IEEE)
   6. National Electrical Code (NEC)
   7. Underwriters' Laboratories (UL)
   8. American National Standards Institute (ANSI)
   9. Uniform Building Code (UBC)
   10. Occupational Safety and Health Administration (OSHA)
   11. Local utility companies
   12. Local Electrical Ordinance
   13. Rural Electrification Association (REA)
   14. Insulated Power Cable Engineers Association (IPCEA)
   15. International Electrical Testing Association (NETA)
   16. National Electrical Contractors Association (NECA)
   17. Association Edison Illuminating Companies (AEIC)
B. Electrical work shall be performed under the direct supervision of a Master Electrician who holds a valid license in the Parish where the work is being performed.

1.05 DELIVERY AND STORAGE

A. Follow the Manufacturer's directions for the delivery, storage and handling of equipment and materials. Tightly cover equipment and materials and protect it from dirt, water, chemical or mechanical injury and theft. Major electrical equipment shall be stored indoors in a climate-controlled atmosphere and space heaters energized where applicable. Stored equipment shall be properly protected from rodents such as mice and rats.

B. Equipment that will be stored indoors for an extended period of time and that do not have space heaters shall have a 100 watt incandescent light placed in it and energized to eliminate the build-up of condensation in the equipment. Coordinate with equipment manufacturer for additional storage requirements. Damaged equipment shall not be acceptable. Upon installation, protect the materials until the work is completed and accepted by the OWNER. Improperly stored equipment is subject to rejection by the Owner/Engineer and will not be allowed to be installed.

1.06 JOB CONDITIONS

A. Permits, licenses, inspections and testing shall be secured and paid for as required by law by the CONTRACTOR for the completion of the work. Certificates of approval shall be secured, paid for, and delivered to the OWNER before receiving the final acceptance of the work.

B. The location of materials, equipment, devices and appliances indicated are approximate and subject to revisions at the time the work is installed. Final location shall be as proposed by the CONTRACTOR and approved by the ENGINEER.

C. Should project conditions require any rearrangement of work, or if equipment or accessories can be installed to a better advantage than the general arrangement of work on the plans, the CONTRACTOR shall before proceeding with the work prepare and submit plans of the proposed rearrangement for the ENGINEER's review and approval.

D. Motor Horsepower ratings identified are anticipated ratings. If the actual equipment is a different size, the CONTRACTOR shall provide the appropriate wiring, conduit, over current protection, starters and accessories for a complete and working system at no cost to the OWNER.

E. Enclosures for equipment in the air-conditioned rooms shall be NEMA 12, 12 gauge steel and NEMA 4X, 316 Stainless Steel or aluminum for all other locations unless noted otherwise. All enclosures shall have a quick release luggage type clasp or single handle operated, 3-point latching system.

F. All enclosures for equipment unless specified otherwise shall be NEMA 4X, 316 stainless steel for exterior applications. All enclosures shall have a quick release luggage type clasp.

G. No equipment is to be energized until the Power System Studies have been COMPLETED by the Engineer, and the breakers have been set per the Short Circuit and Protective Device Coordination Study and the arc flash labels have been installed on the equipment. No exceptions.

1.07 INSTALLATION

A. Maintain the waterproof integrity of conduit penetrations through the roof, exterior walls and floors. Roof penetrations shall not be located above any electrical equipment.

B. Install stainless steel sleeves for each conduit passing through floors. Extend sleeves 1-1/2" above the floor slab and grout watertight. The sleeve sizes shall permit the subsequent insertion of a properly sized conduit or raceway.

C. Submit location drawings and obtain ENGINEER approval prior to installing conduit penetrations through slabs, beams, ceiling and walls. The Contractor shall not core drill through existing beams. After the conduits are installed fill the annular space between the

conduits with mastic. The complete installation shall be watertight and the fire rating of penetrations through walls, floors and ceilings shall be maintained.

D. Install steel reinforced concrete foundations below floor mounted switchboards, panelboards, motor control centers, soft starters, adjustable frequency drives, transformers, and other floor mounted electrical equipment. Concrete foundations shall be not be less than 4" high or as indicated on plans. Neatly chamfer top edges. Concrete foundations shall be 6" wider and 6" longer than the base of the equipment being installed or as indicated on plans. Concrete shall be in accordance with Structural Sheet S-1, and shall be reinforced with a minimum of 6" x 6" #6 welded wire mesh or as indicated on plans.

E. Route all conduits parallel to building lines, columns, or steel route conduits near to columns and roof beams. Conduits shall maintain a minimum of 3” away from adjacent work (duct work, insulations, etc.)

1.08 CUTTING AND PATCHING

A. Provide adequate support during cutting operations to prevent any damage to the affected masonry. Where openings are cut through masonry walls, provide lintels or structural supports to protect the remaining masonry. The cutting of structural members shall not be permitted without the specific written approval of the ENGINEER.

1.09 PAINTING

A. Maintain the original factory finish on material and equipment installed, unless specifically indicated on the plans or specifications. If the finish is marred in transit or during installation, re-finish to a neat, workmanlike appearance equal to the original factory finish. Leave equipment and raceway systems clean and free of grease, dirt, rust, and in a suitable condition for painting.

1.10 EXCAVATION, TRENCHING, BACKFILLING AND GRADING

A. Prior to any excavation or trenching, notify the OWNER's representative, utility companies and OWNER's facilities department. Allow sufficient time for utilities to be located prior to excavation to avoid disruption of services. Provide a minimum of 72 hours written notice to the OWNER prior to trenching or excavation. Do not proceed with trenching or excavation until authorized by the OWNER. Utilities or services which are damaged, which are identified prior to excavation or trenching, or where confirmation by utility companies has not been obtained verifying that utilities are marked, shall be repaired to operable condition immediately, at no cost to the OWNER.

B. Barricade open trenches and excavations for the entire duration of the project. Barricades for excavations shall have warning lights maintained during hours of darkness. Trenches shall be marked with warning tape, or access to trenches shall be prohibited with readily identifiable sawhorses, warning tape or other acceptable means. Barriers shall be illuminated or recognizable during hours of darkness. Barriers and tape shall be properly always maintained.

C. Protect all adjacent work, structures and properties. Damage to adjacent work, structures or properties shall be repaired, or the cost of repair reimbursed in full.

D. All construction areas shall be finally graded as indicated on the contract documents, or to the conditions of the site prior to construction. Grading shall bring the site back to the existing conditions as close as practical. Turfed areas shall be sodded, or hydro-mulched with matching turf. Landscaping shall be replaced with identical shrubbery, ground cover, or plants as existed. The CONTRACTOR shall be responsible for maintaining water on new turf and landscaping until established. If new turf and landscaping is impractical due to weather conditions, CONTRACTOR shall provide satisfactory arrangements to have turf and landscaping furnished and installed at the earliest opportunity thereafter. Provide a 90-day warranty on new turf and landscaping.

E. Determine if irrigation systems exist prior to trenching and excavation. Obtain record or as-built drawings and locate control wiring and pressure main branches and devices. Determine by actual operation that systems are functional and repair or replace damaged systems to their original condition prior to beginning construction.

1.11 LOCKING OF ELECTRICAL FACILITIES

A. Install locks immediately upon the installation of the electrical facility. Provide padlocks for exterior electrical facilities subject to unauthorized entry. Furnish the OWNER with two (2) keys per lock up to a quantity of 10 keys. Furnish locks to match the OWNER's locking system. Locks shall also be provided where required to obtain an electrical Certificate of Occupancy.

1.12 CLEAN AND ADJUST

A. Remove shipping labels, dirt, paint, grease, and stains from equipment. Remove debris as it accumulates. Upon completion of work, clean electrical equipment and the entire electrical installation so that it is suitable for the OWNER's use.

END OF SECTION

26 05 10 ELECTRICAL DEMOLITION

1.00 GENERAL

1.01 GENERAL

A. The work of this section includes furnishing of all labor, tools, materials, and equipment necessary to complete all the demolition required for the project as specified herein and shown on the drawings.

B. Cooperation with the Owner is required, and the work described herein and shown on the drawings shall be coordinated as required to fulfill the intent of the contract.

C. Owner has the first right of refusal for all demolished equipment. Demolished equipment the Owner wants to keep shall be loaded, delivered, and unloaded by the Contractor at a location identified by the Owner within a 2-mile radius of the Spillway.

1.02 INTENT

A. It is the intent of this specification and accompanying drawings to describe and indicate the demolition work to be performed. It is not intended that the specifications and drawings describe and indicate every piece of equipment required to be removed for where items are intended to be removed or as required for the satisfactory completion of the project or is considered to be the accepted practice of the trade, they shall be considered to be specified and indicated.

B. The contractor shall disconnect and remove all conduit, wire and related electrical items as indicated on the drawings, or as required by the project. This includes all abandoned low voltage power, instrumentation, signal and communication cables.

C. The contractor shall seal floor, wall and ceiling openings with thermo setting fire resistive compound and non-shrink grout after removal of conduits.

1.03 SCOPE OF WORK

A. Furnish, install and test all equipment, wiring and appurtenances as may be required to perform the electrical demolition shown on the Drawings and as specified herein.

1.04 SCHEDULES

A. Schedule with the Owner/Engineer for required shutdowns to accommodate system demolition and installation of temporary facilities.

1.05 STANDARDS

A. Temporary wiring of systems to maintain operation of facilities while undergoing modifications and demolition shall be provided in accordance with:

1. American National Standards Institute / National Fire Protection Association (ANSI/NFPA), No. 70 – National Electrical Code (NEC), Article No. 590 – Temporary Wiring.

1.06 QUALITY ASSURANCE

A. Verify field measurements and circuiting arrangements are as shown on the Drawings.

B. Properly locate and mark all underground cable and conduit both inside and outside the substation area.

C. Verify that abandoned wiring and equipment serve only abandoned facilities.

D. Demolition drawings are based on casual field observation and existing record documents. Discrepancies shall be reported to the Owner/Engineer before disturbing the existing installation.

E. By beginning demolition, the Contractor accepts the existing conditions and warrants that he will maintain service to equipment and items not scheduled or indicated for removal.

2.00 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

2.02 DESIGN AND CONSTRUCTION

A. If temporary electrical wiring and facilities are required, the Contractor shall provide such wiring and facilities to comply with the NEC and the requirements of the Owner.

3.00 EXECUTION

3.01 PREPARATION

A. Disconnect electrical systems in walls, floors and ceilings scheduled for removal.

B. Coordinate utility service outages with the Utility Company to provide continuous service to operating equipment.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: always Maintain existing system in service. Disable system only to make switchovers and connections. Obtain permission from the Owner/Engineer at least two weeks in advance, before partially or completely disabling system.

3.02 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Prior to start of demolition, check to determine that power, communication services, etc., such as electricity and telephone, have been disconnected at the source of supply.

B. Demolition shall be performed in such a manner as to avoid hazards to persons and property. Work shall be performed in strict accordance with all Municipal, State and Federal Rules, Regulations, Codes, and Laws which may govern and apply to this work.

C. Remove, relocate and extend existing installations to accommodate new construction.

D. Remove abandoned wiring to source of supply.

E. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, patch surfaces and paint to match existing.

F. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit serving them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

G. Disconnect and remove abandoned panelboards and distribution equipment.

H. Disconnect and remove electrical devices and equipment that has been removed.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing installations which remain active. Modify installation or provide access to panels as appropriate.

K. Where the demolition or revision of any portion of a raceway or box in the raceway system, in an area, causes the raceway system of the area to no longer comply with the classification or specification requirements of the area, the Contractor shall provide and install such boxes, fittings, etc. as may be necessary to return the raceway system to compliance with Specifications.

L. Extend existing installations using materials and methods as specified for new work.

M. Carry out the work in an orderly and careful manner. Hold noise, dust, and vibration to a minimum and conduct the Work to avoid any damage to the surroundings. Remove all items and parts as shown and noted on the Drawings and as otherwise may be required to be removed to carry out the Work.

N. Salvaged Equipment and Materials

1. The contractor shall be responsible for all damage to existing materials not affected by the demolition work. The contractor shall repair or replace damaged material or equipment as directed at no additional cost to the owner. Repairing, patching and painting of areas shall be done by the respective trade involved with the demolition, utilizing workmen skilled in the trade involved with the repair or replacement of the material in question.

2. All equipment removed during demolition shall remain on the site, unless otherwise noted. The Owner reserves all rights to claiming material removed during demolition. The contractor is responsible to remove from the site all material not claimed by the Owner. In addition, the contractor is responsible to load/unload, and deliver to the Owner's storage facilities within a 2-mile radius of the Spillway, equipment claimed by the Owner.

3. The Owner shall have the right to retain any or all electrical and instrumentation equipment shown or specified to be removed from the site.

4. Prior to starting demolition, the Contractor and Owner/Engineer shall jointly visit the areas of demolition and the Owner/Engineer will designate those items that are to remain the property of the Owner.

5. Equipment and material designated by the Owner, as remaining the property of the Owner, shall be removed from the structure and hauled to a designated location on the

site and stored for the Owner's use. Store on wood runners raised above the surrounding grade and cover with weather resistant covering and tie securely or store inside Owner furnished storage as directed by the Owner/Engineer.

6. Take necessary precautions in removing Owner designated property to prevent damage during the demolition process. Remove steel structural members by unbolting, cutting welds, or cutting rivet heads and punching shanks through holes. Do not use a cutting torch to separate the Owner's equipment or material unless approved by the Owner/Engineer.

7. Generally, items to be salvaged, shall be removed in one piece or in a manner that does not impact their reuse. Loose components may be removed separately. Controls and electrical equipment may be removed from the equipment and handled separately. Large units may be handled separately. Salvaged piping shall be taken apart at flanges or fittings and removed in sections.

O. Material removed from the construction site during demolition, and any equipment not otherwise designated to remain the property of the Owner in accordance with the pre-demolition identification process shall become the property of the Contractor, and shall be promptly removed from the construction site and properly disposed of.

P. The Contractor shall refurbish and replace any existing facility to be left in place which is damaged by the demolition operations at no additional expense to the Owner. The repair of such damage shall leave the parts in a condition at least equal to that found at the start of the Work.

3.03 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory (panelboard schedules) showing revised circuiting arrangement.

END OF SECTION

26 05 19 LOW VOLTAGE ELECTRICAL CONDUCTORS & CABLES

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment, and incidentals necessary to install and test 600-volt wires and cables. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

B. Work shall include building wire, cable, wiring connections and terminations, and modular wiring systems.

1.02 QUALITY ASSURANCE: TESTING

A. Megger test circuits for continuity and ground. Verify phasing at connection points. Torque test conductor connections and terminations to the Manufacturer's recommended values. Megger tests shall be performed by a testing company with a minimum of 10 years’ experience. All low voltage cables shall be verified by use of telephone communications.

1.03 SUBMITTAL PROCEDURES

A. Submittal Procedures shall be in accordance with Section 01 30 00, “Document Management” and shall include:

1. Shop Drawings:

a. Low voltage wire

b. Ground wire

c. Shielded cable

d. Terminations and Connections

B. Once cable is delivered to the site, Contractor shall provide as a formal submittal documentation/pictures showing when cable was manufactured.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

ICEA S-19-81/NEMA WC-3	Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
ICEA S-61-402/NEMA WC-5	Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NFPA 70	National Electrical Code
ANSI/TIA/EIA 606A	Standard for Telecommunications Infrastructure
UL 83	Thermoplastic Insulated Wires and Cables
UL 1063	Machine Tool Wires and Cables

ASTM B3	Soft or Annealed Copper Wires
ASTM B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium, Hard, Soft

1.05 DELIVERY AND STORAGE

A. Deliver cable and wire to the project site in the original packages. Conductors with damaged insulation or exposed nylon jacketing shall not be permitted.

B. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable.

C. Check for reels not completely restrained, reels with interlocking flanges or broken flanges, damaged reel covering or any other indication of damage. Provide impact protection by wood lagging or suitable barrier across the traverse of the reel.

D. Do not drop reels from any height.

E. Unload reels using a sling and spreader bar. Roll reels in the direction of the arrows shown on the reel and on surfaces free of obstructions that could damage the wire and cable.

F. Store cable on a solid, well drained location. Cover cable reels with plastic sheeting or tarpaulin. Do not lay reels flat.

G. Provide moisture protection by using manufacturer's standard procedure or heat shrinkable self-healing end caps applied to both ends of cable. Do not remove end caps until cables are ready to be terminated.

2.00 PRODUCTS

2.01 GENERAL

A. Wires and cables shall be soft-drawn, annealed copper with a conductivity of not less than that of 98% pure copper, UL83 and UL1063 listed, rated 600 volts and certified for continuous operation at maximum conductor temperature of 90 Celsius in dry locations and in wet locations

B. Conductors #8 or larger shall be stranded and conductors #14 shall be stranded. Utilize single conductors.

C. Except for control, signal and instrumentation circuits and as specifically indicated on the plans the minimum conductor permitted is #12.

2.02 WIRE MARKING

1. Wire marking shall be in accordance with the National Electrical Code Article 310 and shall be printed on the wire insulation at 2-foot intervals. The printing method used shall be permanent and the color shall sharply contrast with the jacket color.

2. Wire marking shall include the U.L. label and necessary identification, including the Manufacturer, the number of conductors, size, conductor insulation type, sun-resistance, and other pertinent information.

2.03 CONDUCTORS AND CABLES

A. SINGLE CONDUCTOR CABLES: Conductor with thermoplastic insulation rated at 600 volts and insulated with type XHHW-2 insulation. Wire shall be water tank tested and approved as machine tool wire, in accordance with National Machine Tool Builders Association. Wire in light fixture channels and other special locations shall be as specifically noted for temperature in NEC Article 300. Conductors #8 or larger and conductors #14 shall be stranded. Wire shall be manufactured by Southwire, Okonite, Encore, or General Cable.

B. MULTI-CONDUCTOR CABLES: Type TC; multi-conductor cable specifically approved for the installation of cable trays, in accordance with NEC Article 340. Each cable conductor shall be insulated with XHHW-2 type insulation rated at 600 volts. The individual conductors shall be twisted together and jacketed with a PVC outer covering. Cables shall be 600 volts in accordance with NEC-725 and IEEE 383 and shall be suitable for wet location. Cable shall be as manufactured by Southwire, Okonite Okoseal-N, or General Cable.

C. GROUND WIRE: Ground wire shall be Class B stranded tin-plated conductor without insulation in all cases where a single ground wire is indicated to be installed in a conduit with no other conductors in the conduit, or where the ground wire is directly buried in earth or concrete. In all other cases, insulate ground wire with green insulator as specified for low voltage wire.

D. PAIRED SHIELDED CABLE: Individually and overall shielded 16 gauge, 7/28 stranded, tinned copper conductors with .021" extruded PVC; .004" nylon insulation twisted into pairs, stranded into a core and enclosed by a non-hygroscopic core tape, 100% coverage, helically wound, aluminum foil shield, drain wire, and .050" minimum extruded PVC jacket. Pairs shall be black/red or black/white numbered. Cables shall be 600 volts in accordance with NEC-725 and IEEE 383 and shall be suitable for wet location and cable tray rated. Cables shall be manufactured by Okonite, General Cable, Southwire, or Belden.

2.04 WIRE CONNECTIONS AND DEVICES

A. CONNECTORS, COMPRESSION, COPPER, 600 VOLT: As manufactured by Burndy, Thomas & Betts, or Ideal Industries; of the appropriate hole sizes and spacing which are in accordance with NEMA standards; two (2) holes in the tongue for use on conductor sizes 250 kcmil or larger; not required for connections to the circuit breakers in the lighting and/or receptacle panels. All compression connectors shall be long-barrel type, no exceptions.

B. 600 VOLT PLASTIC TAPE: Minnesota Mining & Manufacturing Company (3M), No. 35.

C. WIRENUTS: Silicone-based pre-filled spring wire connecting devices with plastic covering; UL listed for damp and wet locations. Wirenut shall meet requirements of UL 486D for Sealed Wire Connector Systems and shall be manufactured by Ideal Industries, Inc model 63, or as manufactured by ITT or Panduit. Wirenut shall be spring insulated, properly sized and resistant to vibration may be used for No.12 through No.10 solid gauge conductor for lighting and branch circuits only.

D. SPLIT BOLTS: Kearney, Burndy, or Ilsco; shall be usable for connecting conductors which are both copper, both aluminum or one copper and one aluminum. Split bolts shall have a spacer between the two conductors, which it connects.

E. MECHANICAL SET SCREW CONNECTOR: Blackburn HPS, ADR-ALCUL, GP or GT, Burndy or Ilsco; consisting of an aluminum body which has openings on opposite ends for insertion of the conductors. Conductors inserted into these holes shall each be clamped by two set screws. Connectors shall be suitable for use with copper conductors.

F. RUBBER TAPE: Scotch 2210.

G. VINYL TAPE: Scotch 88.

H. ARC PROOFING TAPE: 3M "Scotch 77 Fire and Electric Arc Proofing Tape". Fireproofing shall be done with a half-lapped layer of arc proofing tape, anchored at each end with a double wrap of 3M "Scotch 69 Glass Cloth Electrical Tape".

I. INSULATING RESIN: Scotch 3576, 3577, or 3578.

J. POWER DISTRIBUTION BLOCKS: Mersen, Ilsco or Allen-Bradley; rated for 600 VAC and termination of copper conductors. Individual poles shall be constructed of tin-plated aluminum and mounted on an insulating base.

3.00 EXECUTION

3.01 PREPARATION

A. Completely swab raceway system before installing conductors. Do not use cleaning agents and lubricants which have a deleterious effect on the conductors or their insulation.

3.02 INSTALLATION

A. GENERAL

1. Install raceway first as a complete system without conductors. Do not install pull wires and conductors until the raceway system is in place in accordance with the NEC and these specifications. Exception: Only flexible connections to motors shall be permitted to be installed after the installation of the remainder of the raceway system. The installation of these conductors shall be limited to exposure to damage for a maximum of one (1) week prior to installing flexible connection and making final terminations. Any conductors exposed to damage (i.e. not installed in raceway) longer than one (1) week shall be subject to rejection by the Owner and/or Engineer. If rejected, the cables shall be removed, discarded, replaced, reinstalled and retermination at the Contractor's expense.

2. Installed unapproved wire shall be removed and replaced at the Contractor's expense.

3. Grouping conductors together into one conduit shall not be allowed where the plans indicate the conductors to be placed in separate conduits. Each home run shown on the plans shall be in its own conduit.

4. Neatly train wiring inside boxes, equipment and panelboards. Pull conductors into a raceway at the same time and use U.L. listed, wire pulling lubricant for pulling No. 4 AWG and larger wire.

5. Except for hand-pulled conductors into raceways, all wire and cable installation shall be installed with tension-monitoring equipment. Where conductors are found to have been installed without tension-monitoring, the conductors and cables shall be

immediately removed from the raceways, permanently identified as rejected material, and removed from the jobsite. New conductors and cables shall be reinstalled, tagged and raceways resealed, all at the Contractor's expense.

6. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii. Where pulling compound is used, use only UL listed compound compatible with the cable outer jacket and with the raceway involved.
7. All wire and cable installed in cable trays shall be UL Listed as Type TC, for cable tray use.
8. Where single conductors and cables in manholes, hand holes, vaults, cable trays, and other indicated locations are not wrapped together by some other means such as arc and fireproofing tapes, bundle throughout their exposed length all conductors entering from each conduit with nylon, self-locking, releasable, cable ties placed at intervals not exceeding 4 inches on center.
9. Properly support cables in accordance with the NEC and manufacturer's recommendations in all raceways. Provide strain relief as required.
10. Arrange wiring in cabinets and panels neatly cut to proper length, remove surplus wire, and bundle and secure in an acceptable manner. Identify all circuits entering motor control centers or other control cabinets in accordance with the conductor identification system specified herein and in specification Section 26 05 53, "Identification for Electrical Systems."
11. Cap spare conductors and conductors not terminated, with the UL listed end caps.
12. Where conductors pass through holes or over edges in sheet metal, remove all burrs, chamfer all edges, and install bushings and protective strips of insulating material to protect the conductors.
13. For conductors that will be connected by others, provide at least 6 feet spare conductors in free standing panels and at least 2 feet spare in other assemblies. Provide additional spare conductor in any assembly where it is obvious that more conductors will be needed to reach the termination point.
14. Each circuit shall include a ground wire. Sharing grounds or neutrals is not allowed.
15. Cable with a manufacture date of greater than twelve (12) months previous of being installed will not be acceptable. If cable is older than 12 months and is installed, then Contractor shall replace and install new cable at no cost the Owner

B. SPLICES

1. Power Conductors: Splice in junction boxes or at outlets only for lighting and receptacle branch circuits. Splices for all other circuits shall be disallowed. All splices are subject to the Engineer's approval. Obtain approval from Engineer before installing any splices.
    a. For existing installations, splices of 120V circuits shall use twist-on wire nuts.
    b. For splices of existing 480V circuits, the Contractor shall terminate the existing and new conductors using power distribution blocks mounted in a junction box.
2. Control and Instrumentation Conductors: No splicing of control and instrumentation conductors shall be permitted between terminal points except as specifically indicated on the plans.

3. No splicing of conductors shall be performed in any below ground structure.
4. Condulet type fittings shall not contain splices. Under no condition shall conductors of a different color be spliced together.
5. For No. 10 and smaller, connect conductors with a twist-on spring wirenut. If a splice or tap is below 3' above the final grade, fill the spring connectors with an electrical insulating resin so that the resin encapsulates conductor and spring materials. Conductor splices and taps inside the MCC, AFDs, panels, etc. shall be on the terminal strips or power distribution blocks.
6. For No. 8 and larger, connect conductors with a split bolt type of connector or a mechanical, set screw type connector. Wrap splices and taps with a single half-lapped layer or rubber tape followed by successive layers of vinyl tape until a vinyl tape layer thickness of twice the original conductor insulation thickness is achieved. If splice or tap is below 3' above the finished grade, the tape or splice shall have a final outer coating or insulating resin.

C. TERMINATIONS

1. Conductors terminated on a screw termination shall have a crimp on type spade connector applied on the wire end, Panduit PanTerm or approved equal.
2. Furnish and install power distribution blocks as required for tapping conductors at their load connection point with conductors of smaller size. Install power distribution blocks with the number of poles and sizes needed for connecting the phase, neutral, and ground conductors.
3. Tighten all screws and terminal bolts using torque type wrenches and/or drivers to tighten to the inch-pound requirements of the NEC and UL.
4. Use crimp connectors on all stranded conductors.
5. Soldered mechanical joints insulated with tape will not be acceptable.
6. SINGLE CONDUCTORS: Sufficient wire shall be left at outlets to make connections to equipment without straining. Light switches and receptacles shall be connected with pigtails and crimp-on connectors.
7. PAIRED SHIELDED AND TRIAD SHIELDED CABLE: Ground paired shielded and triad shielded cables at the instrument panel or starter end only and insulate from ground elsewhere. The shield shall be continuous for the entire run. The paired shielded and triad shielded cable shall not be laced with or placed in the same conduit with power cables and digital control cables. Each termination of paired shielded or triad shielded cable shall be coated with silicone jelly after termination. The shield of pair shielded cable and triad shielded cable shall only be broken when the conductors are terminated on terminal strips. Each conductor and shield shall be landed on its own terminal. Sharing of shield shall not be allowed.

D. GROUNDING

1. Conduits and other raceway shall contain an equipment grounding conductor whether the raceway is metallic or not. Conduits, motors, cabinets, outlets, and other equipment shall be properly grounded in accordance with National Electrical Code requirements. Where ground wire is exposed to mechanical damage, install wire in rigid

aluminum conduit. Make connections to equipment with solderless connections. All connections to ground rods shall be of the fused type utilizing an exothermic welding process.

2. Ground metallic material, including but not limited to metallic raceway, metallic boxes and metallic enclosures. Where metallic material is not connected by raceway to a solid ground, connect the metallic material to the largest equipment grounding conductor, which it houses. Clean the metal surface under the grounding lug to bright metal. Grounding connections to motors shall be to the grounding stud, which shall be threaded into the stationary frame; Use Burndy KC Servit or approved equal. The ground wire shall not be lugged to a mounting bolt.
3. Ground wire shall be uninsulated tin plated copper sized as shown on the plans in all cases where a single ground wire is indicated to be installed in a conduit with no other conductors in the conduit, or where the ground wire is directly buried in earth or concrete. In all other cases, insulate ground wire with green insulation as specified for low voltage wire. Provide and size bonding conductors in accordance with the National Electrical Code.
4. Provide a bare uninsulated ground wire to run the entire length of all cable trays. The contractor shall bond to each section and to every enclosure served by conductors routed through the cable tray system

E. TESTING

1. Testing: All testing required shall be per Specification Section 26 01 26, “Testing of Electrical Systems”.
2. Perform tests and inspections and prepare test reports and submit to the Owner/Engineer prior to final inspection. Test reports shall be submitted as required by Specification Section 26 01 26, “Testing of Electrical Systems”. All test reports shall be submitted in one binder under Specification Section 26 01 26, “Testing of Electrical Systems”.
3. Tests and Inspections:
    a. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
    b. Perform each visual and mechanical inspection and electrical tests stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
    c. Test Reports: Prepare a written report to record the following:
        1). Test procedures used
        2). Test results that comply with requirements.
        3). Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
    d. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

26 05 26 GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install a complete grounding system in strict accordance with Article 250 of the National Electrical Code (NEC) as shown on the drawings or as specified herein. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 SUBMITTALS

A. Submittal shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Grounding materials, equipment and processes.
2. Product Data: For each type of product supplied.
3. Field quality-control grounding test reports.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

1.04 JOB CONDITIONS

A. Measure the ground grid resistance with the earth test megger and install additional ground rods and conductors as required until the resistance to the ground conforms to National Electrical Code requirements. Ground resistance measurement shall not exceed 5 ohms. Add ground rods as required to bring resistance to 5 ohms and connect to grounding system.

2.00 PRODUCTS

2.01 MATERIALS

A. GROUND RODS: Copper clad, having a diameter of 3/4" and a minimum length of 10'.

B. GROUND CABLES: Stranded, bare tinned copper of 98% conductivity and as specified in Section 26 05 19, “Low Voltage Electrical Conductors & Cables”.

C. CONDUIT GROUND FITTINGS: Fittings for bonding ground cable to the conduit shall be FCI Burndy Corp., type NE or Thomas & Betts No. 3951 series.

D. GROUND ROD BOXES: Precast Box with cast iron lid. Lid shall read “ground rod” on lid. Brooks Precast Model. “3-RT” or approved equal. Ground rod boxes located in driveway areas shall have an AASHTO HS-20 rating.

E. EXOTHERMIC WELDING PROCESS: CADWELD MATERIALS – as manufactured by ERICO products or approved equal.

2.02 PROCESSES

A. All grounding system connections to building steel and ground rods shall be exothermically welded including all cable connections, and cable steel terminations. The use of mechanical type connections is not acceptable.

B. Any concealed connection (buried, encased in concrete or otherwise sealed) shall be done only with exothermic welds.

C. All materials involved must be from the same sources to insure compatibility. Connections made from this process shall meet the requirements of IEEE Standards 80 and 837 and as listed in MIL 419 and other standards, National Electrical Code, etc.

2.03 GROUNDING SYSTEM

A. Provide a complete grounding system that includes all connections and the testing of ground rods, ground cables, ground buses, generator enclosures, conduits, fittings, anchor supports, thermite process materials and equipment and other materials required for a complete installation. Grounding system shall be installed and sized in accordance with the National Electrical Code.

3.00 EXECUTION

3.01 INSTALLATION

A. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted/clamp type connectors.

2. Underground Connections or any concealed location: Exothermically welded connectors,

3. Connections to Ground Rods at Test Wells: Exothermically welded connectors.

4. Connections to Structural Steel: Exothermically welded connectors.

5. Connections to equipment: NEMA ground pads and insulated jumpers.

6. Connection to Ground Pad: Exothermic.

7. The use of “pig tails” for connections to ground loops or equipment shall not be allowed.

B. Ground electrical work in accordance with NEC Article 250 and local codes.

C. Install ground cables in conduits above grade or directly buried in earth to a depth of not less than 30" below grade. Installation to provide sufficient mechanical protection so as not to break ground cables or connections. If ground cables are exposed, run in conduits for added protection.

D. Install ground cables continuously between connections. Splices shall not be permitted, except where indicated on the plans. Where ground cables pass through floor slabs,

buildings, etc., and when not in metallic enclosures, provide a sleeve of approved, non-metallic materials.

E. Install a green-colored, equipment grounding conductor in raceways. Size conductors in accordance with NEC Article 250.

F. Where ground wire is directly buried in earth or concealed in concrete, structures or duct banks use standard bare copper cable, in all other cases install a green-colored insulation, equipment grounding conductor in accordance with Section 26 05 19, “Low Voltage Electrical Conductors & Cables”. Size conductors in accordance with NEC Article 250. Provide grounding conductors as required per the NEC. For larger conductors where green insulation is not available, provide green indicating tape per the National Electrical Code.

G. Metal conduits stubbed up into panelboard, control panels, enclosures, switchgear, starter panels or other electrical equipment shall be terminated with insulated grounding bushings and connected to the equipment ground bus. Size the grounding wire in accordance with applicable sections of the National Electrical Code. Provide grounding and bonding jumpers as required per the NEC and sized in accordance with the NEC.

H. Provide exothermic weld connection for extension to existing stub-up ground conductors.

I. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

   1. Provide grounding and bonding jumpers as required per the NEC.

   2. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

   3. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment. Bolt-on or crimp-on connections in lieu of exothermic welds, shall only be used upon Owner/Engineer’s approval in writing on a case by case basis.

   4. Use exothermic-welded connectors for outdoor locations, but if a disconnect type connection is required; use a bolt on crimp type lug.

J. Grounding and Bonding for Piping:

   1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

   2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

   3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

K. Liquid tight flexible metal conduit in sizes 1-1/2” or larger shall have exceptional bonding jumpers. Bonding jumpers shall be external, run in parallel (not spiraled) and fastened with

plastic tie wraps. Bonding jumpers shall be insulated copper conductors. CONTRACTOR shall provide bonding jumpers sized in accordance with the National Electrical Code.

L. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and all other equipment and materials required by the NEC to be grounded, shall be grounded and bonded in accordance with the NEC. Provide grounding and bonding jumpers as required per the NEC and sized in accordance with the NEC.

M. Ground transformer neutrals to the nearest available grounding electrode with a conductor sized in accordance with NEC Article 250.

N. Where exothermic bonding is used, molds shall be of the appropriate size for the wire and rod used. All bonds shall remain exposed for inspection of the OWNER's Representative.

O. Run #4/0 bare tinned copper grounded conductor in all cable trays, whether new or existing. Bond ground to each section of the cable tray, to each enclosure, and enclosure ground bus, where cable terminates, to each pump frame and motor frame, and to the building counterpoise. Install cable on the outside rail of tray to avoid damage to conductors from sharp edges on grounding clamps.

P. Ground rod shall be installed such that the top of the ground rod is 6" below grade and enclosed by a ground rod box.

Q. At each convenience outlet, install a grounding clip attached to the outlet box and leave a sufficient length of #12 wire with green-colored insulation to connect to the grounding terminal at the receptacle.

R. Install #4/0 AWG bare tinned copper ground cable that follows the route of the underground duct banks on top of the duct bank envelop, but in no case is embedded in the concrete. Run ground through the manholes and bond to ground rods in manholes.

1. Connect the ground cables of the duct bank to the nearest buried ground loop at both ends. If a ground loop is not available for connection at an end of a duct bank, the Contractor shall drive a 3/4" x 10' ground rod at the end of the duct bank and terminate the ground cable run along the top of the duct bank to the ground rod.

2. Ground all metallic cable racks, supports, and ladders by #4/0 bare copper ground loop exposed on the inside walls of the manhole. Connect the copper loop to the grounding cable that is run above the duct bank and through the manhole.

S. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 4/0 AWG bare, copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

T. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each vault, manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors' level or plumb around corners and fasten to manhole walls. Ground all metallic cable racks, supports, and ladders by #4/0 bare copper ground loop exposed on the inside walls of the

manhole. Connect the copper loop to the grounding cable that is run above the duct bank and through the manhole.

3.02 INSPECTION

A. Inspect the grounding and bonding system conductors and connections for tightness and proper installation.

B. Use Biddle Direct Reading Earth Resistance Tester or equivalent to measure resistance to ground of the system. Perform testing in accordance with the test instrument manufacturer's recommendation using the fall of potential method.

C. All test equipment provided under this section shall be approved by the ENGINEER.

D. Resistance to ground testing shall be performed during dry season. Submit test results in the form of a graph showing the number of points measured (12 minimum) and the numerical resistance to ground.

E. Testing shall be performed before energizing the distribution system.

F. A separate test shall be conducted for each building or system.

G. Notify the ENGINEER immediately if the resistance to ground for any building or system is greater than five ohms. Provide additional ground rods and conductors as required to bring the resistance to five ohms.

H. Submit reports of all tests to the Owner/Engineer.

END OF SECTION

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

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

B. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

2. Construction requirements for concrete bases.

1.02 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

1. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include Record Data.

B. Provide calculations for load limits for all trapeze-type supports, support assemblies and field fabricated support systems.

1.04 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

1.05 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

2.00 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

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

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

a. Allied Tube & Conduit.

b. Cooper B-Line, Inc.; a division of Cooper Industries.

c. ERICO International Corporation.

d. GS Metals Corp.

e. Thomas & Betts Corporation.

f. Unistrut; Tyco International, Ltd.

g. Wesanco, Inc.

2. Channel Dimensions: Selected for applicable load criteria.

3. Slotted channel shall be 316 stainless steel.

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

C. Conduit and Cable Support Devices: 316 stainless steel hangers, clamps, straps and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; 316 stainless steel.

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

1. Mechanical-Expansion Anchors: Insert-wedge-type, 316 stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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

1). Cooper B-Line, Inc.; a division of Cooper Industries.

2). Empire Tool and Manufacturing Co., Inc.

3). Hilti Inc.

4). ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

5). MKT Fastening, LLC.

2. Concrete Inserts: Stainless Steel, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

4. Through Bolts: 316 Stainless Steel, Structural type, hex head, and high strength. Comply with ASTM A 325.

5. Toggle Bolts: 316 Stainless steel springhead type.

6. Hanger Rods: Threaded 316 stainless steel.

7. Washers: 316 Stainless steel.

3.00 EXECUTION

3.01 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RIGID METAL CONDUIT as required by NFPA 70. Minimum rod size shall be 3/8 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with stainless steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, RIGID METAL CONDUIT may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

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

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

2. Install anchor bolts to elevations required for proper attachment to supported equipment.

3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

D. All floor mounted equipment shall have a 4” thick housekeeping pad on top of concrete foundations or floor for interior equipment.

END OF SECTION

26 05 33.01 CONDUITS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install a complete conduit system for each type of electrical system. Electrical work shall be in accordance with Div. 26 ELECTRICAL specifications.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Record Data to include cut sheets of each material to be used on the project.
2. The Electrical Contractor in conjunction with the Contractor shall issue a letter stating that the arrangement of the duct banks to drain is coordinated with the proposed site grading.

1.03 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

ANSI C80.5	Electrical Rigid Aluminum Conduit
ANSI/NEMA FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
NEMA RN 1	PVC Externally-Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
NEMA TC 2	Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 3	PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA TC 14	Reinforced Thermosetting Resin Conduit (RTRC) and Fittings

2.00 PRODUCTS

2.01 MANUFACTURED PRODUCTS

A. RIGID ALUMINUM CONDUIT: Heavy wall, aluminum alloy 6063, copper free; low temper number, tube, free from defects and manufactured in accordance with ANSI C80.5 standards and U.L. listed. Acceptable manufacturers shall be Indalex, Allied and Wheatland.

B. PVC COATED RIGID ALUMINUM: Meeting the requirements of rigid aluminum conduit; 40 mil PVC exterior coating and 2 mil urethane interior coating, U.L. 6A listed. Acceptable Manufacturers shall be Rob Roy Plastibond Red, Ocal and Perma-Cote.

C. LIQUID TIGHT FLEXIBLE GALVANIZED STEEL CONDUIT: Single strip, helically wound, interlocking, steel, in accordance with U.L. 1. Liquid tight conduit shall have an extruded, polyvinyl jacket over the flexible metal. Acceptable product shall be Anaconda Type U.A.

D. FITTINGS AND CONDUIT BODIES:

1. RIGID METAL CONDUIT: Threaded type material to match the conduit, in accordance with ANSI/NEMA FB1 and as manufactured by Appleton Form 35, Killark "O" Series, Crouse Hinds, OZ Gedney, or RACO.

2. FLEXIBLE AND LIQUID TIGHT FITTINGS: In accordance with ANSI/NEMA FB1; cadmium-plated, malleable iron body and nut; aluminum ferrule; insulated throat; integrally-cast, external ground lugs, as manufactured by Appleton "ST" series, Hubbel, OZ Gedney Type 4QL, or RACO.

E. ELBOW AND BENDS: Conduit systems shall use PVC coated aluminum or as indicated on plans.

F. BUSHINGS: High impact, thermosetting, phenolic insulation; 150 degrees C.; as manufactured by Appleton "BBUH", Blackburn, or OZ Gedney type A.

G. GROUNDING BUSHINGS: Conduit grounding bushings shall consist of an aluminum, insulated throat conduit bushing with an attached aluminum set screw lug. Grounding bushing shall comply with Fed. Spec. W-F-408b and W-W-C-581d, UL Standards 514B and 467, and shall be Crouse Hinds Lazy Lug or approved equal.

H. HUBS:

1. ALUMINUM CONDUIT: Cast aluminum, with broad flat surfaces with gripping teeth on both sides of conduit entry. Hub portion on exterior side of entry shall contain "O" ring for watertight seal of conduit entry. Hubs shall be Meyers Hub, Appleton or Efcor.

I. CONDUIT THROUGH-WALL AND FLOOR SEAL: Malleable iron body with oversized sleeves, sealing ring, pressure clamp and rings and sealing grommet; hex head cap screw, as manufactured by OZ Gedney, type FSK.

J. END BELLS: Threaded, malleable iron or fiberglass or PVC, as manufactured by OZ Gedney type TNS. Fiberglass or PVC end bells shall be provided in manholes and hand holes.

K. EXPANSION FITTINGS: Aluminum with copper bonding jumpers. Linear expansion fittings shall be OZ Gedney Zx for rigid, use with aluminum conduit or Appleton "XJ" series. Combination linear and deflection expansion fittings shall be OZ Gedney type AXDX.

L. THREADED NIPPLES: As manufactured by Allied or Triangle. Aluminum Conduit nipples shall have two (2) independent sets of threads. Running threads shall not be used. Utilize the conduit union when joining two (2) fixed conduits in a continuous run.

M. ACCESSORIES: Reducers, washers, etc., shall be cadmium-plated, malleable iron.

N. IDENTIFYING TAPE FOR BURIED CONDUITS: 6" wide, polyethylene with continuous printing along the length of the tape, as manufactured by Brady "Identoline" or Sentry Line "Terra Tape". Use red with black letters for buried electrical power conduits. Use green with black letters for buried electric instrumentation and communication conduits.

O. CONDUIT DRAINS: Conduit drains shall be 316 stainless steels as manufactured by Crouse Hinds ECD Universal, or approved equal.

P. DUCT BANK SPACERS: Interlocking module spacers as manufactured by Formex or approved equal.

Q. LINK SEAL: Link seal shall be modular, mechanical type, consisting of inter-locking synthetic rubber links shaped to continuously fill the space between the conduit and the wall opening. Link seal shall be suitable for use in a core-drilled and pre-cast wall openings and shall be manufactured by Pipeline Seal & Insulator, Inc or approved equal.

3.00 EXECUTION

3.01 CONDUIT INSTALLATION SCHEDULE

A. Conduit types shall be installed in accordance with the following schedule:

1. BURIED OR CONCRETE ENCASED CONDUIT: Schedule 40 PVC unless noted otherwise. Conduit below grade shall not be smaller than 2".
2. ABOVE GRADE CONDUIT: Rigid Aluminum unless noted otherwise.
3. PVC COATED RIGID ALUMINUM CONDUIT: Shall be used for conduit stub-ups through concrete and concrete wall penetrations and for elbows and bands in concrete encased duct banks as required by specification.
4. RIGID ALUMINUM CONDUIT: May be used in all locations. PVC coated rigid aluminum conduit shall be used in corrosive environments or where in contact with concrete.
5. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT: Shall only be used to equipment in non-hazardous locations not subject to physical damage or excessive temperatures, requiring vibration isolation unless otherwise indicated, 18" maximum length for conduits less than 2", a maximum of a 4'-0" for conduits larger than 2". The bending radius shall be in accordance with Chapter 9, Table 2 of the NEC and shall not deform or alter the flex jacket.

3.02 INSTALLATION

A. GENERAL

1. Size conduits as required by the National Electrical Code for the number and sizes of wires to be drawn into the conduit. Conduit less than ¾" shall not be used unless specified otherwise. No conduit less than 2" shall be allowed to be installed in ductbanks even if exposed section of raceway is a smaller trade size.
2. Conduit stubbed-up under free standing enclosures located indoors/outdoors in an electrical room, etc., such as a motor control center, shall be PVC and have a PVC end bell terminator that is solvent welded onto each conduit end. End bell shall be installed flush with the finished floor. No PVC shall be exposed to daylight or be installed such that any portion is out of concrete housekeeping pad or duct bank.
3. Underground conduit shall be steel reinforced concrete encased. Conduit which is below the finished grade shall be PVC schedule 40, except where indicated on the plans or noted otherwise. Unless otherwise indicated, all other conduit shall be rigid aluminum.

4. Conduits terminating inside an air-conditioned space from outside shall be sealed to prevent moisture/condensation from entering the enclosure.
5. Duct banks routed below building slabs or any equipment pad shall be steel reinforced concrete encased.
6. At the transition from underground and or from concrete, protect conduit from mechanical damage by extending PVC coated rigid aluminum conduit a maximum of 12" and a minimum of 4" into the earth or concrete at the transition.
7. Aluminum conduit, straps, and struts shall not be in direct contact with concrete. Provide a neoprene washer between the two materials.
8. Aluminum conduit which penetrates concrete shall be factory-coated with 0.40" of polyvinylchloride, per Spec. MIL-P-15147.
9. Conduit extending into concrete shall not be closer than 3" from adjacent conduit and shall not be closer than 1" from any reinforcement bars.
10. PVC conduit shall not be installed above grade level, above concrete slab level, or for any exposed installations unless specified. All transitions from concealed to exposed shall be made with PVC coated aluminum. Conduit shall not be placed horizontally in a concrete floor slab or a beam without the ENGINEER's written approval.
11. Flexible metal conduit (sealtight) used for connecting light fixtures, i.e., fixture whips, shall be 1/2" as a minimum. Fixture whips shall contain only three conductors: one hot, one neutral, and one equipment grounding conductor. Other conduit types shall be 3/4" as a minimum. The inside surface of the conduit shall be reamed smooth after it has been cut.
12. Provide conduit sizes as shown on the plans. Where hash marks are used to indicate the number of conductors in a conduit without indicating the conduit size, provide a 3/4" conduit for up to nine #12 conductors, and a 1" conduit for ten to 20 #12 conductors.
13. Where conduits stub up through a floor slab from below finished floor level for multi-level structures, install a threaded fitting with PVC plug so that the top of the fitting is flush with the concrete or finished floor surface.
14. Conduit system shall be swabbed clean prior to installation of conductors.
15. Ground conduits in accordance with the National Electrical Code and Specification 26 05 26, “Grounding & Bonding for Electrical Systems”.
16. Contractor shall properly tape PVC coated aluminum conduit where it transitions to PVC conduit in underground concrete encased duct banks so that no aluminum conduit is in contact with concrete encasement. Tape shall be manufactured by Scotch or approved equal. Coordinate with tape manufacturer for type of tape to use for the installation.

B. UNDERGROUND

1. Underground conduit shall be steel reinforced concrete encased. Where underground conduits are routed under a concrete slab on grade and brought up under slab the duct bank reinforcing steel shall be tied into the slab.
2. Bury underground conduit a minimum of 18" deep to the top of the concrete encasement for 600V duct banks and 36” for medium voltage duct banks, and as shown

on the plans, whichever is greater. Backfill buried conduit banks with material which is free from large rock, paving material, or large angular substance. Install underground conduit with the conduit duct bank dimensions shown on the plans. Adhere to conduit spacing by using spacers at intervals to ensure that proper spacings are maintained. The concrete shall be red in color. Apply dye in concrete truck, sprinkling dye on top of the duct bank after concrete placement is prohibited. **PAYMENT WILL NOT BE MADE FOR CONCRETE POURED WITHOUT APPLYING THE RED DYE IN TRUCK AS SPECIFIED.** Place 3" CMU blocks under rebar cage to suspend rebar off the bottom of the trench so that it does not contact the soil and is completely encased in the concrete envelope when concrete is placed.

3. Where underground conduits terminate in a vault or underground structure, dowell duct bank rebar into any below grade structure-wall, vault, manhole, etc. Where duct bank goes below slab-on grade, rebar shall follow raceway under slab and turn up with raceway and be concrete encased and tied into slab rebar.
4. Grade underground and outdoor conduits to drain free of condensation and moisture. Provide for automatic draining at low points. Install horizontal runs of conduit to provide a natural drain for condensation without pockets or traps where moisture may collect.
5. Underground conduits shall drain to an underground structure with a floor drain, such as a manhole.
6. Install conduit drain assemblies in outside or underground conduits to provide for draining.
7. Underground conduit bends shall have a long sweep bend radius.
8. Minimum size for underground conduits is 2".
9. Contractor shall install duct bank spacers a minimum of every 8 feet.
10. Conduit shall slope uniformly at not less than 4" per 100', or more than 60" per 100' unless indicated otherwise on the plans or approved by the Engineer. Arrange duct banks to drain into manholes with no low pockets in the duct runs. The electrical contractor shall coordinate with the Contractor and the plans on the proposed grades for the site.

C. ROUTING AND SUPPORT

1. Use the conduit route where shown on the plans. Route conduits that do not have a specified route in the most direct path between the two points, i.e. home runs shown with an arrow symbol. Route conduits parallel to building lines. Concealed conduits on the plans shall be below grade, within walls, or above ceilings.
2. Route conduit through roof openings for piping and ductwork where possible. Otherwise, route conduit through the roof with pitch pocket. Conduit shall not penetrate ductwork. Exposed conduit shall not be installed on the roof without the ENGINEER's prior approval.
3. Install conduit at elevations which maintain headroom, and at locations which avoid interference with other work requiring grading of pipe, the structure, finished walls, etc. Avoid crossing other work. Conduits shall not be placed in close proximity to

equipment, systems, and service lines. Maintain a minimum of 3" separation, except in crossing which shall be a minimum of 1". Conduits shall not be installed/concealed in water bearing walls.

4. Conduits in buildings shall be exposed on unfinished ceilings and basements, as shown on the plans. Rigidly support conduits to the building structures using hardware bolted or screwed to the structure. The mounting hardware shall not mount the conduit directly on concrete walls and ceilings but shall space the conduit away from the surfaces using mineralac-type hardware, strut channel clamps, or one hole straps with clamp backs.
5. Provide expansion fittings at expansion, construction and seismic joints. Provide combination expansion/deflection fittings where conduits are concealed at these joints.
6. Group conduit in parallel runs where practical. Use a conduit rack constructed of channels with conduit straps or clamps. Provide space for an additional 25% conduit.
7. Parallel runs of conduit shall have bends and offsets made at the same point such that the angle of bend is the same in each conduit and the conduits remain parallel throughout the run. Conduits not installed in this manner shall be removed and reinstalled at the Contractor's expense. Conductors that are installed shall be removed and replaced at the Contractor's expense.
8. Conduits installed in parallel shall be arranged such that crossings are eliminated.
9. Rigid aluminum conduit systems shall utilize aluminum straps, clamps and strut channel. Coated rigid steel or aluminum conduit shall utilize PVC factory coated or fiberglass straps, clamps and thread rods, etc. as manufactured by Robroy.
10. Nuts, bolts, concrete anchor bolts and other metallic fasteners shall be 316 stainless steel.
11. Install conduit other than fiberglass with threaded couplings and other threaded fittings. Threadless, or clamp type fittings shall not be used on metallic conduit. Rigid aluminum conduit shall have each set of threads coated with an oxidation inhibitor, Ilsco, De-Ox, ITT Noalox, Blackburn Contax or approved equal.
12. Use PVC coated aluminum elbows for bends in PVC conduit.
13. Use suitable conduit caps to protect installed conduit against entry of dirt and moisture. The use of duct tape or any other tape shall be prohibited.
14. Use watertight hubs to fasten conduit to metal boxes, etc. in wet or damp locations per the National Electrical Code.
15. Install a pulling string in empty (spare) conduit, except sleeves and nipples, and leave for future pulling as applicable.
16. Expansion/deflection fittings made of neoprene in outdoor applications shall have aluminum lagging over the neoprene held in place with stainless steel tie-wraps.

D. TERMINATIONS

1. Use threaded hubs for termination of conduits. Locknut termination of conduits shall not be used on this project.

2. Conduit terminations shall not penetrate the top of NEMA 4X and NEMA 3R enclosures. Enclosures with top penetrations shall be removed and replaced with conduits re-routed for side or bottom penetration at Contractor's expense. If conductors have been installed and are too short to accommodate the re-routed conduit, then they shall be removed and replaced at the Contractor's expense.

END OF SECTION

26 05 33.02 WIREWAYS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install a complete wireway system. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”. Contractor shall size wireways in accordance with the National Electrical Code.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include Record Data for:

1. Wireways

2.00 PRODUCT

2.01 MATERIALS

A. WIREWAY: Provide as manufactured by Hoffman or equal.

B. WIREWAY ENCLOSURES, SUPPORTS AND ASSOCIATED FITTINGS: NEMA 4X, 316 stainless steel for all locations, lay-in wireway, quick release cover stainless steel latches, continuously welded seams, oil resistant gasket. Hoffman Lay-In-Type NEMA 12 or NEMA 4X wireway or equal. Factory ANSI 61 gray finish for NEMA 12.

C. Wireways shall have integral lugs. NEMA 4X wireways shall have quick release luggage type stainless steel latches.

2.02 FABRICATIONS

A. WIREWAYS: Complete wireway system with enclosures, supports, and associated fittings, having the form and dimension suited to the application, and as manufactured by Hoffman or approved equal.

3.00 EXECUTION

3.01 INSTALLATION

A. Provide systems of wireways of sufficient size where indicated.

B. Size wireway cross-sectional area and length based upon conductor fill and equipment served as required by NEC and local codes.

C. Install types based on environmental conditions to which exposed.

D. Mount wireways only with lugs. Space 1/4” off of wall. Drilling of NEMA 4X wireways is prohibited. NEMA 4X wireways drilled will be removed and replaced at contractor’s expense.

END OF SECTION

26 05 33.03 OUTLET BOXES

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install outlet boxes. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

A. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.

B. EGS/Appleton Electric.

C. Erickson Electrical Equipment Company.

D. Hoffman.

E. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.

F. O-Z/Gedney; a unit of General Signal.

1.03 SUBMITTALS

A. No submittals required for Section 26 05 33.03, “Outlet Boxes”.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

ANSI/NEMA OS 1	Sheet steel outlet boxes, device boxes, covers and box supports.
ANSI/NEMA OS 2	Non-metallic outlet boxes, device boxes, covers and box supports.

2.00 PRODUCTS

2.01 MATERIALS

A. GENERAL: Furnish boxes with proper covers and device plates

B. CAST BOXES: Cast aluminum metal, deep type, gasketed cover, threaded hubs and integral mounting lugs. Use cast boxes for all installation. Boxes shall be manufactured by Crouse-Hinds, Appleton or approved equal. Provide integral mounting lugs and provide integral conduit hubs on all boxes.

3.00 EXECUTION

3.01 PREPARATION; COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes in the locations shown on the Plans, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify locations of boxes and outlets prior to rough-in. Outlet locations may be modified to accommodate changes in door swings, space changes or to clear other interferences that arise or from job modifications. Make such modifications at no cost to the OWNER as a matter of job coordination. Coordinate job conditions and notify the ENGINEER of discrepancies before proceeding with the installation of the work. Set wall boxes in advance of wall construction blocked in place, and secured. Install extension sleeves as required to extend boxes to finished surfaces.

C. Provide 1/4" spacer behind all boxes.

D. Never drill through the back of boxes for mounting. Drilled boxes will be rejected and shall be replaced at the Contractor's expense.

E. Unless otherwise noted, location of outlet boxes shall be as follows:

Equipment or Outlets	Elevation *(A.F.F.)
Toggle switches	4'0"
Receptacles	2'-0" in the Pump Station Pump Room and everywhere else mount at 1'6"

Equipment or Outlets	Elevation *(A.F.F.)
Flow/Level Transmitters	5'5"
Circular Chart Recorder	5'5"
Motor starters	5'0"
Control stations	4'0"
Manual starters	5'0"
Thermostats in office areas	4'0"
Telephone outlets	1'6"
Circuit protective devices	6'6" to top of enclosure

* Above Finished Floor.

F. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors in accordance with other sections of the specifications.

3.02 INSTALLATION

A. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

B. Provide plugs for unused openings.

C. Use multiple-gang boxes where more than one (1) device is installed together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

D. Install boxes in walls without damaging wall insulation.

E. Align wall-mounted outlet boxes for switches, thermostats and similar devices.

F. Mount all boxes using only the integral lugs. Drilling through the box to mount is prohibited. Any box mounted by drilling through the box will be rejected and shall be replaced at the Contractor's expense.

G. All boxes shall be installed with spacers so that at least 1/4" air space is maintained between the back of the box and the wall.

END OF SECTION

26 05 33.04 PULL AND JUNCTION BOXES FOR ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install pull and junction boxes. The CONTRACTOR shall be responsible for sizing all pull boxes and junction boxes per the National Electrical Code (NEC) Article 314 and all other relevant sections of the NEC. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

A. Appleton

B. Bryant

C. Crouse Hinds

D. Hoffman

E. Hubbell

F. O Z Gedney

G. Raco

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include the following shop drawings:

1. Pull and Junction Boxes
2. Detailed wiring/interconnection diagram for junction boxes where required by the plans required junction box with terminal blocks. Provide cutsheets on terminal blocks being provided.
3. Pull and Junction Boxes Sizing Calculations: Detailed calculations shall be submitted to the ENGINEER with the pull and junction boxes’ initial submittal. Submittals submitted without sizing calculations shall not be accepted.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

NEMA 250	Enclosure for Electrical Equipment (1000 volts maximum)
ANSI/NEMA OS 1	Sheet steel Outlet Boxes, Device Boxes, Covers and Box Supports
NEC	National Electrical Code

2.00 PRODUCTS

2.01 MATERIALS

A. GENERAL: Exposed wall pull, and junction boxes shall be 316 stainless steel or aluminum. Exposed pull boxes or junction boxes installed outdoors, per NEMA 250 shall be weatherproof and shall be provided mounting lugs with watertight gasketed covers fastened with stainless steel screws and be 316 stainless steel. All hardware shall be 316 stainless steel. Boxes shall be provided with integral mounting lugs.

B. NEMA 1 for Air Conditioned spaces and NEMA 4X, 316 stainless steel for all other locations unless otherwise noted.

C. PULL AND JUNCTION BOXES: Metal construction conforming to National Electrical Code and ANSI/NEMA OS 1 with a hinged cover and quick release stainless steel luggage type clasp, 1/4 turn screw with handles or 3-point handle operated latch system. Latching systems requiring tools are not permitted. Provide hinge type for boxes of 12" or larger in any dimension. Boxes shall be provided with integral mounting lugs. Hinge, hasp and all hardware shall be 316 stainless steel. Back panel shall be aluminum.

D. TERMINAL BLOCKS: Where required on the plans provide 600V rated terminal blocks in pull/junction boxes. Terminal blocks shall be 600V, manufactured by Allen-Bradley, Phoenix Contact or approved equal.

3.00 EXECUTION

3.01 INSTALLATION

A. Use separate pull boxes and junction boxes for electric power, control and communication systems.

B. Install pull boxes and junction boxes where required by the National Electrical Code and wherever required to overcome mechanical difficulties.

C. Install pull boxes in interior conduit at not more than 100' apart when conduit runs are not broken by junction or outlet boxes.

D. Pull and junction boxes shall be accessible and not buried.

E. Do not install boxes back to back in walls and provide a minimum of 6" separation, except in acoustic-rated walls, provide 24" separation.

F. Support boxes independently of conduit except for cast boxes that is connected to two rigid metal conduits, both supported within 12" of box.

G. Junction boxes shall have terminal strips/distribution blocks for splicing conductors where approved by the ENGINEER or as shown/specified on the plans. Terminal strips shall be manufactured by Allen-Bradley, Phoenix Contact or approved equal. Distribution blocks shall be per Section 26 05 19, “Low Voltage Electrical Conductors & Cables”. No top entry in junction boxes with a terminal strip.

H. Box shall be mounted using mounting lugs. Drilling through the box to mount is prohibited. Any box drilled to mount will be rejected and shall be removed and replaced at the Contractor’s expense.

I. Provide at least 1/4 inch air space between the back of the box and the wall.

J. Conduit penetrations in the top of any enclosure or junction box is strictly prohibited in all areas except dry NEMA 1 areas. Any enclosure top penetrated will be rejected and shall be removed and replaced at the Contractor's expense.

END OF SECTION

26 05 43.01 MANHOLES AND CONCRETE PULL BOXES FOR ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment, and incidentals necessary to install concrete electrical manholes and pull boxes, as specified, and indicated on the plans. Manhole sizes, if shown on the plans, are the minimum size allowed. CONTRACTOR shall be responsible for sizing all manholes and pull boxes in accordance with the National Electrical Code, Article 370, and relevant sections of the NEC. CONTRACTOR shall be responsible for setting elevations at manhole and cable entry locations to meet the intent of the specifications and plans. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE

A. ACCEPTABLE MANUFACTURERS; PRECAST: Precast concrete products shall comply with the specifications and shall be produced by the following Manufacturers:

1. Brooks Products
2. American Industrial Precast Products
3. Dalworth Quickset Co.
4. Old Castle
5. No Equal

B. ACCEPTABLE MANUFACTURERS; CASTINGS: Metal castings shall comply with the specifications and shall be produced by the following Manufacturers:

1. McKinley Iron Works, Fort Worth, TX
2. Neenah Foundry, Neenah, WI

C. DESIGN CRITERIA: Concrete for precast concrete shall obtain a compressive strength of minimum at 28 days and shall be an air-entrained mix of the Manufacturer's standard mix design.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management”, and shall include:

1. Manholes and pull boxes
2. CONTRACTOR shall provide detailed conduit layout showing number, size, and location of conduits entering the manholes. Cables routed in conduits shall be clearly identified using project specific cable numbers. Details shall also show elevation of conduits entering manholes. Manhole details shall be submitted to the ENGINEER for approval prior to the duct bank/manhole system being installed.

3. Manhole and Concrete Pull Box Calculations: Detailed calculations shall be submitted to the ENGINEER with the Manhole and Pull Box initial submittal. Submittals submitted without sizing calculations shall not be accepted.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

AASHO H-20	"Standard Specifications for Highway Bridges"
ANSI/ASTM A-15	"Zinc Coating (Hot Dipped) on Iron and Steel Hardware"
ANSI/ASTM A-569	"Steel, Sheet and Strip, Carbon (0.15% Maximum), Hot Rolled, Commercial Quality.
ASTM A-48	"Gray Iron Castings"
ASTM A-123	"Zinc (Hot Galvanized) Coatings on Products fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips."
ANSI C-2	"National Electrical Safety Code"

2.00 PRODUCTS

2.01 MATERIALS

A. MANHOLE FRAMES AND COVERS: Class 30B gray cast iron conforming to ASTM A-48; machine finished with flat bearing surfaces.

B. SUMP COVERS: Class 30B gray cast iron conforming to ASTM A-48.

C. PULLING IRONS: 316 Stainless Steel bar with 7/8" diameter forming a triangle of 9" per side when set; galvanized according to ANSI/ASTM A-153 for irregularly shaped articles.

D. CABLE RACK INSERTS: 316 Stainless Steel channel inserts with a minimum load rating of 800 pounds; length to match cable rack channel.

E. CABLE RACK CHANNEL: 4" x 1-1/2" x 3/16" 316 stainless steel channel wall bracket, 48" long, with cable rack arm mounting slots on 8" centers.

F. CABLE RACKS: 2-1/2" x 14" 316 stainless steel channel with high glazed, wet-process porcelain insulators conforming to ANSI/ASTM A-569.

G. GROUND ROD: 3/4" x 10’ copper clad steel, installed in the floor of the manhole, and all metallic cable racks, irons, etc. grounded (to the ground rod). Ground rod may be field installed, but floor penetration shall be sealed against the entrance of water under positive head.

H. JOINT SEALANT: Flexible plastic gasket of flexible butyl resin sealant.

I. DAMPPROOFING: Sonneborn, Div. of ChemRex, Inc. or approved equal.

1. BITUMINOUS DAMPPROOFING

    a. Cold-Applied, Emulsified-Asphalt Dampproofing:
        1). Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
    b. MISCELLANEOUS MATERIALS

        1). Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

2.02 MIXES

A. Concrete and reinforcing shall be in accordance with Section 03 30 00, “Cast-In-Place Concrete”.

2.03 FABRICATIONS

A. PRECAST CONCRETE

1. Precast concrete shall be a factory-controlled product, reinforced in accordance with AASHTO HS-20 bridge loading requirements. Units shall be precast in modular sections with tongue and groove joints. Manholes shall have the following characteristics:

    a. Shape: Square

2. Provide a 42" diameter, grooved opening in top section. Neck and shaft diameter shall be 36" clear dimension. Provide a 12" drain opening and two (2) 1" ground rod openings in the base section.

3. Provide conduit openings on each wall for conduits as required. Openings for conduits shall be large enough to permit conduit penetrations. Coordinate with Contractor for the outside diameter of the type of conduit being installed. Openings shall be at elevations required to permit drainage and all other specification and plan requirements. Provide cable pulling irons opposite each set of conduit openings along wall.

4. Conduit openings shall be centered for straight through pulls and off to the outside of center for 90 degree or angled pulls. Coordinate conduit openings with the duct bank routing shown on the site plan.

5. Include inserts for cable racks at 6” on center. Include precast manhole steps at 16" centers.

3.00 EXECUTION

3.01 PREPARATION

A. Excavate hole for a suitably sized manhole which permits installation and inspection. Base material and backfill shall be in accordance with the Manufacturer's printed instructions and the provisions of Section 31 05 13, “Soils for Earthwork”, of these specifications.

3.02 INSTALLATION

A. PRECAST CONCRETE MANHOLES: Install manholes in accordance with the Manufacturer's printed instructions. Manholes shall be plumb and level. Use precast neck and shaft sections to bring manhole entrance to finished grade 6” above finished grade.

B. At the intersection of electrical duct banks and manholes, both existing and new, Contractor shall install (4) #4x3’-0” dowels into the electrical manhole with Hilti RE 500 adhesive and 2/3 wall thickness embedment. Do not damage manhole wall reinforcement. Do not core drill the holes. Provide a 2’-0” lap splice with continuous duct bank reinforcement.

C. MANHOLE ACCESSORIES

1. Install a ground rod in each of two (2) base section openings with the top of the rod protruding 4" above the manhole floor.

2. Attach cable racks to inserts after manhole installation is complete.

3. Dampproof exterior surfaces of manholes, including joints and interruptions after concrete has cured for a minimum of 28 days. Dampproofing shall be cold-applied, emulsified-asphalt dampproofing, Apply two brush or spray coats of Dampproofing at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat

4. Waterproof exterior surfaces of manholes, including joints and interruptions after concrete has cured for a minimum of 28 days.

5. Manhole frames, pulling irons and cable rack channels shall be grounded to the ground rods. All metal shall be bonded to grounding system. Grounding shall meet the requirements of Section 26 05 26, “Grounding & Bonding for Electrical Systems”, and Articles 250 and 450 of the National Electrical Code.

D. SUPPORTING CABLES ON WALLS

1. Support cables by cable racks. Provide quantity of racks by the number of conductors routed through manholes. Provide minimum of two cable hooks per rack.

2. Install a minimum of two racks on each wall in each manhole.

3. Cable racks shall be provided for installation of future conductors.

4. Instrumentation cables, power cables, and control cables shall be kept separately when routed along racks through manholes.

E. GROUNDING

1. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 4/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

F. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors' level or plumb around corners and fasten to manhole walls. Ground all metallic cable racks, supports, and ladders by #4/0 bare copper ground loop exposed on the inside walls of the manhole. Connect the copper loop to the grounding cable that is run above the duct bank and through the manhole.

END OF SECTION

26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

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

B. Section Includes:

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

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Record Data:

a. Product Data to include cut sheets for each electrical identification product to be used on the project. Provide example of labeling for Owner/Engineer approval prior to beginning any work.

2. Post-Submittal Meeting for Tagging Requirements:

a. The Contractor shall submit a detailed plan a minimum of three (3) weeks in advance of the post-submittal meeting. The plan shall include how the Contractor proposes to label all pull boxes, junction boxes, concrete pull boxes, manholes and hand holes provided under this contract.

b. As a minimum the following shall be at the post-submittal meeting: Electrical Contractor, no exceptions. Contractor shall determine the number of people attending the meeting and cover each person’s cost.

1.03 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, are not acceptable.

2.00 PRODUCTS

2.01 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. All markings to labels, schedules, tags or nameplates shall be machine printed only. Hand printing is prohibited. Circuits shall be tagged at terminations (both ends), in pull boxes, cabinets, and enclosures as follows:

1. Tags relying on adhesives or tapes-on markers are not acceptable, unless noted otherwise.
2. Handwritten tags are not acceptable.
3. Provide conductor tags for conductors No. 10 AWG and below with legible permanent sleeve of yellow or white PVC with machine printed black marking, Raychem TMS sleeves or approved equal.
4. Provide tags for cables and for conductors No. 8 AWG and larger consisting of permanent nylon marker plates with legible designations hot stamped on the plate. Attach these marker plates to conductors and cables with stainless steel wire wraps. Tags shall be Raychem TMS-CM cable markers or approved equal.
5. Tags shall be imprinted with panelboard and panelboard position number (e.g. LA3-23) for conductors fed from panelboards. Other conductors shall have tags imprinted with the MCC which feeds the conductors (e.g. MCC 1).
6. Switchlegs shall have the designation described above on their tags, plus an “S” suffix. Travelers shall have the designation described above on their tags, plus a “T” suffix.
7. Where more than one neutral is present with a group of conductors, a tag shall be applied to each neutral indicating which phase conductors are served by each neutral (e.g. HA-2, 4, 6).

2.02 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.03 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE

2.04 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal size, 7 by 10 inches.

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

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

2.05 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Attach plates to equipment with stainless steel screws. Provide an O-ring for screws on NEMA 4X enclosures, O-rings shall maintain the integrity and NEMA 4X rating for enclosures.

B. NAMEPLATES:

1. For indoor applications with Air Conditioning: Plastic, white 1" letters on black background, on the front of each door on the switchgear; identifying the compartment contents for each compartment.

2. All other applications: Plastic, black 1" letters on white background, on the front of each door on the switchgear; identifying the compartment contents for each compartment.

3. Attach nameplates with a stainless-steel screw and nut at each end of the nameplate. Adhesive backed nameplates shall not be installed.

4. Label that includes tag designation shown on Drawings for the transformer, switchgear, panelboards or other electrical equipment.

2.06 CONDUIT IDENTIFICATION PLATE

A. A conduit identification plate shall be installed on all power, control, instrumentation and communications conduits at the end of each run and at the conduit ends inside intermediate junction and pull boxes, manholes, handholes, etc. Conduit plates shall be installed before conductors are pulled into the conduits. Exact identification plate location shall be coordinated with the Owner/Engineer at the time on installation. The conduit identification

tags shall identify the cable numbers as shown on the FNI plans and the “to” and “from” information. Coordinate with Owner for exact requirements for plate material and type. Provide an example to Owner/Engineer as a formal submittal for approval prior to the installation. Attach conduit identification plate with stainless steel tie wraps or stainless-steel wire.

3.00 EXECUTION

3.01 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with stainless steel mechanical fasteners appropriate to the location and substrate.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.02 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase Identification. Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

a. Color shall be field applied for sizes larger than No. 8 AWG

b. Colors for 120/240V Circuits:

1). Phase A: Black

2). Phase B: Red

3). Neutral: White

4). Equipment Grounding Conductor: Green

c. Colors for 208/120-V or 240V/120V, 3-phase Circuits:

1). Phase A: Black.

2). Phase B: Red.

3). Phase C: Blue.

4). Neutral: White

5). Equipment Grounding Conductor: Green

d. Colors for 480/277-V Circuits:

1). Phase A: Brown.

2). Phase B: Orange.

3). Phase C: Yellow.

4). Equipment Grounding Conductor: Green

e. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

B. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.

2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

3. Identifying line shall be continuous along the entire underground route.

C. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels

1. Comply with 29 CFR 1910.145.

2. Identify system voltage with black letters on an orange background.

3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.

b. Controls with external control power connections.

D. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

E. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems

include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:
    a. Indoor Equipment: stainless steel screws and nuts, engraved and laminated nameplates. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Fasten labels with appropriate mechanical fasteners and gaskets that do not change the NEMA or NRTL rating of the enclosure and void the U.L. listing of the enclosure.
2. Equipment to Be Labeled:
    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be laminated acrylic or melamine label and placed in a clear plastic sleeve.
    b. Enclosures and electrical cabinets.
    c. Starters
    d. Switchgear.
    e. Switchboards.
    f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    g. Motor-control centers.
    h. Enclosed switches.
    i. Enclosed circuit breakers.
    j. Enclosed controllers.
    k. Push-button stations.
    l. Contactors.
    m. Monitoring and control equipment.
    n. UPS equipment.
    o. Conduits
    p. Power Factor Correction Capacitors
    q. Adjustable Frequency Drives
    r. Pull boxes, junction boxes, concrete pull boxes, manholes and hand holes.

END OF SECTION

26 05 73.01 ELECTRICAL POWER SYSTEM STUDIES

1.00 GENERAL

1.01 DESCRIPTION

A. General: This section specifies that the Contractor prepare a short circuit and protective device coordination study, load flow and an arc flash hazard analysis for the electrical power system as shown on the plans.

B. NO EQUIPMENT IS TO BE ENERGIZED UNTIL THE POWER SYSTEM STUDIES HAVE BEEN APPROVED BY THE ENGINEER, THE PROTECTIVE RELAYS AND BREAKERS HAVE BEEN SET PER THE SHORT CIRCUIT AND RELAY COORDINATION STUDY AND THE ARC FLASH LABELS HAVE BEEN INSTALLED ON THE EQUIPMENT. NO EXCEPTIONS.

C. The short circuit and protective device coordination study shall provide an evaluation of the electrical power system and the model numbers and settings of the protective relays, circuit breakers, or devices and power metering or motor monitoring devices for setting by the Contractor. The Study shall include settings for all protective relays, circuit breakers, and electric system power meters and monitoring devices. Studies shall also include setting for breakers associated with the stand-by generator. The Contractor shall obtain any needed data or information from the Contract Documents, various suppliers, and from conducting his own field investigations.

D. Scope:

1. The Contractor is responsible for providing all pertinent information necessary for the successful completion of the Short Circuit and Protective Device Coordination Study, Arc Flash Analysis, Load Flow and Motor Starting Study. All cable and raceway data, data for existing motors, data from all new electrical equipment - switchgear, motor control centers, panelboards, and separately mounted fuses, starters or circuit breakers, etc. shall be obtained by the Contractor. Obtain all existing or new protective device information to include all present settings. The Contractor shall obtain any needed data or information from Contract Documents, various suppliers, the Electric Utility and from conducting his own field investigations. The data obtained shall be organized and submitted to the Engineer to show that all the necessary data gathering work has been done.

2. Calculations shall utilize actual X/R and three phase short circuit values obtained by the contractor from the Electric Utility.

3. Provide a complete short circuit study. Include three phase and phase-to-ground calculations. Provide an equipment interrupting or withstand evaluation based on the actual equipment and model numbers provided on this project. Generic devices are not acceptable. Normal system operating method, alternate operation, and operations that could result in maximum fault conditions shall be thoroughly addressed in the study. The study shall assume all motors operating at rated voltage with the exception that motors identified as "standby" shall not be included. Electrical equipment bus impedance shall be assumed zero. Short circuit momentary duties and interrupting duties shall be calculated based on maximum available fault current at the electrical equipment busses. The Study shall be performed using actual available short circuit

currents available and system impedances as obtained from the Electric Utility. An assumption of infinite bus for the purposes of the Study is not acceptable. Study shall use actual motor X/R and subtransient reactance data obtained from equipment suppliers.

4. A protective device coordination study shall be performed to determine appropriate relay and circuit breaker settings. The study shall include all electrical equipment provided under this contract and any up-stream equipment that has an impact on the coordination study. The study shall show transformer damage curves, generator damage curves, cable short circuit withstand curves and motor curves. Include all medium and low voltage switchgear, distribution switchboards, motor control centers, VFDs, and panelboards main circuit breakers. Complete the short circuit study down to the main breaker or main lugs on all panelboards. Panelboard branch circuit devices need not be considered. The phase over current and ground-fault protection shall be included as well as settings for all other adjustable protective devices. All motor monitoring relays and protective or monitoring devices that are a part of a supplier's equipment (such as soft starters or variable frequency drives) shall be in included. Include the last protective device in the Electric Utility's system feeding each facility being considered.
5. Provide Time-Current Curves on 11X17 log-log paper. Do not put more than one branch of protective devices on any one coordination curve. Include a one-line diagram and the names of each protective device in the branch. Use the names designated in the Contract Documents. Include motor and transformer damage curves, and cable short circuit withstand curves. Coordination study time-current curves (11x17 log-log type) including the instrument transformer ratios, model numbers of the protective relays, and the relay settings associated with each breaker. Organize the curves as specified here in. Ground fault time current curves shall be on a separate sheet.
6. An equipment evaluation study shall be performed to determine the adequacy of the fault bracing of all bus from the panelboard level up to the main Switchgear or protective device. Include circuit breakers, controllers, surge arresters, busway, switches, and fuses by tabulating and comparing the short circuit ratings of these devices with the available fault currents.
7. Provide arc flash hazard analysis in accordance with the applicable NFPA, ANSI, and IEEE standards.
8. Provide a load flow study in accordance with IEEE 399.
9. Provide a Motor Starting Study.
10. The studies shall be performed, sealed and signed by a Registered Professional Engineer licensed in the State of Louisiana.
11. Any problem areas or inadequacies in the equipment shall be promptly brought to the Engineer's attention.
12. Use industry standard short circuit software, SKM CAPTOR and DAPPER or an equal approved by the Engineer.
13. The report shall include a comparison of short circuit duties of each bus to the interrupting capacity of the equipment that is protecting that bus.

14. The report shall include all data that was used as an input to the report. The data shall include cable impedance, conduit type, source impedance, equipment ratings, transformer impedance and X/R, and motor X/R and subtransient reactance data, etc.
15. The Contractor shall coordinate with the local Utility, CLECO Power LLC, Contact: Drew Maroney PH: 318-308-9150 for electrical data required to perform the studies.
16. The studies shall include and model the different operating configurations that may be encountered at the site where the studies are being performed. This includes different transformers operating individually and in parallel with main and tie breakers open and closed. The studies shall clearly identify the operating configuration being evaluated.

1.02 REFERENCES

A. This Section contains references to the following documents. They are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

Reference	Title
IEEE 141	Recommended Practice for Electric Power Distribution for Industrial Plants
IEEE 242	Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
NFPA 70E	Handbook for Electrical Safety in the Workplace
IEEE 1584	IEEE Guide for Performing Arc-Flash Hazard Calculations
NEC	National Electrical Code

1.03 SCHEDULE

A. The approved reports shall be completed, and a copy sent to the electrical distribution equipment manufacture 45 days before the equipment is shipped to the Work site. The report shall be provided to the Engineer NO LATER THAN 90 days before the equipment is shipped to the Work site. SHIPMENT AND DELIVERY OF EQUIPMENT WILL NOT BE ACCEPTED AT THE JOBSITE UNTIL THE STUDY HAS BEEN COMPLETED, SUBMITTED AND APPROVED BY THE ENGINEER.

1.04 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:
    1. Prior to electrical equipment submittals (shop drawings) being provided to the Engineer for review and approval, Contractor shall provide preliminary short circuit study to show the available fault current at the major equipment buses all the way down to the 120/240V panels. Preliminary study shall be submitted 30 days prior to receiving first submittal.

2. Short Circuit and Protective Device Coordination Study. Time current curves shall be on 11x17 log-log type paper. The Contractor can provide time current curves on 8 ½ x 11 log-log type paper as a supplement but not as a replacement.
3. Load Flow Study
4. Motor Starting Study
5. Arc Flash Hazard Analysis
    a. Provide a copy of project specific Arc Flash labels for each panelboard, switchgear, switchboard, disconnect, Motor Control Center, transfer switch, including all remaining existing electrical equipment.
    b. Provide a color copy of project specific Arc Flash labels for each panelboard, switchgear, switchboard, disconnect, motor control centers, transfer switches, including all remaining existing electrical equipment.
    c. Provide a 11x17 copy of the one-line diagram color-coded to show the incident ranges & clothing classifications at each bus. Provide a table indicating the color coding used for each incident range & clothing classification. The following is a recommended color coding for the following Hazard/Risk Category numbers:
        1). Blue to indicate up to 4 cal/cm^2
        2). Brown to indicate >4 cal/cm^2 to ≤8 cal/cm^2
        3). Yellow to indicate >8 cal/cm^2 to ≤25 cal/cm^2
        4). Orange to indicate >25 cal/cm^2 to ≤40 cal/cm^2
        5). Red to indicate >40 cal/cm^2
6. The Contractor shall redo the Power System Studies if any changes are made in the field during field testing checkout and start-up. The Contractor shall resubmit the Power System Studies for Engineer Approval. The Studies shall include updated copy or the Arc Flash Labels.
7. After the report and one-line has been approved, provide a color copy in PDF format of the finalized 11x17 one-line diagram to the Contractor for the Contractor's use to frame in the electrical room as specified in section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL. The one-line shall reflect all changes made including but not limited to changes made during construction
8. Two Software copies of actual project data files and a PDF copy of the Report burned in on a CD. The Contractor shall provide an electronic copy on a CD-ROM of all files used to develop the electrical system model in the power system analysis program and all files for the written study analysis and summary data tables. This shall include any library files used for circuit breakers, fuses, etc. for the power system analysis. For instance, if SKM software is used to perform the power system studies, then the SKM files shall be burned in on the CD-ROM along with any other supporting data and provided to the Owner/Engineer.

2.00 EXECUTION

2.01 GENERAL

A. Provide a short-circuit and protective device coordination study, arc flash hazard analysis, load flow and motor starting study on the electrical power distribution system, as specified. The studies shall be performed in accordance with IEEE Standards 141 and 242, IEEE 1584, ANSI, and the NEC and shall utilize the ANSI method of short circuit analysis in accordance with ANSI C37.010. The studies shall be performed using actual equipment data for all equipment. The coordination studies shall use the data from the manufacturer of protective devices.

2.02 QUALIFICATIONS

A. The studies shall be performed by the by an electrical manufacturer/consultant service/electrical testing agency who is regularly engaged in power system studies. A Licensed Professional Engineer with proficiency in electrical power engineering shall conduct the studies and shall seal and sign the studies. The Professional Engineer shall be licensed to practice engineering in the State of Louisiana. A study submitted without a Professional Engineer's seal will not be reviewed and returned Not Approved, Revise & Resubmit. **EQUIPMENT MANUFACTURERS SHALL NOT BE ALLOWED TO PERFORM THE STUDIES, NO EXCEPTIONS.**

B. Acceptable Power System Study Providers:

1. Strategic Engineering – Jeff Wilbanks, P.E. (214) 679-0092
2. All others shall submit qualifications to the Owner and the Engineer for review and approval prior to bid submittal no later than one week after bid advertisement date. Any submittals after this time period shall not be evaluated. Qualifications shall include Power Systems Studies providers who have had at least 5 years of successful experience in the performing studies of similar projects with a generator and pump station configurations. Qualifications shall include a list of similar projects within the last 5 years with the name of the project and contact information of the Owner**.**

2.03 OPERATING SCENARIOS

A. The following Operating Scenario(s) shall be included in the study:

a. Electrical distribution system powered from normal utility power.

b. Electrical distribution system operated from emergency bypass circuit.

c. Electrical distribution system powered from 60kW standby generator.

2.04 SHORT CIRCUIT STUDY

A. The Contractor shall be responsible for obtaining and verifying all data needed to perform the study.

B. As a minimum, each short circuit study shall include the following:

1. One-Line Diagram:

a. Location and function of each protective device in the system, such as relays, direct-acting trips, fuses, etc.

b. Type designation, current rating, range or adjustment, manufacturer's style and catalog number for all protective devices.

c. Power and voltage ratings, impedance, primary and secondary connections of all transformers. Use the ratings (ie. Impedence, X/R, etc.) of the actual transformers being provided where available.

d. Type, manufacturer, and ratio of all instrument transformers energizing each relay.

e. Nameplate ratings of all motors and generators with their subtransient reactances. Transient reactances of synchronous motors and generators and synchronous reactances of all generators. Obtain data on the actual equipment being provided. Generic or average data numbers are not acceptable.

f. Sources of short circuit currents such as utility ties, generators, synchronous motors, and induction motors. Provide short circuit studies using each source of power separately. The study shall determine if there is sufficient short circuit current to adequately cause interruption of a protective device using the weaker power source (typically local generation), and shall determine if the equipment can safely interrupt the fault if the greater power source is connected. Additional short circuit calculations shall include emergency as well as normal switching conditions as well as normal and emergency power sources described here in.

   1). Show short circuit calculations listing short circuit levels at each bus. Provide the same data in tabular from.

   2). Use the same names to designate the various pieces of equipment as employed in the Contract Documents.

g. All significant circuit elements such as transformers, cables, breakers, fuses, reactors, etc shall be included.

h. The time-current setting of existing adjustable relays and direct-acting trips, if applicable.

i. One-line diagram showing available fault current at each bus all the way down to 120/240V, 208Y/120V panelboards.

2. Impedance Diagram:

   a. Available MVA or impedance from the utility company.

   b. Local generated capacity impedance.

   c. Bus impedance.

   d. Transformer and/or reactor impedances.

   e. Cable impedances.

   f. Equipment impedances.

   g. System voltages.

   h. Grounding scheme (resistance grounding, solid grounding, or no grounding).

   i. Motor contribution assuming the new and future motors as shown on the plans all running at the same time.

3. Calculations:

    a. Determine the paths and situations where short circuit currents are the greatest. Assume bolted faults and calculate the 3-phase and line-to-ground short circuits of each case.

    b. Calculate the maximum and minimum fault currents.

    c. A discussion section evaluating the adequacy or inadequacy of the equipment method of calculation and formulas used such that all calculations can be verified manually by the Engineer, with recommendations as required for improvements to the system.

    d. Any inadequacies shall be called to the attention of the Engineer and recommendation made for improvements.

2.05 PROTECTIVE DEVICE COORDINATION STUDY

A. As a minimum, the coordination study for the power distribution system shall include the following on 5-cycle, log-log graph paper:

1. The time-current coordination analysis shall be performed with aid of a digital computer.

    a. Time-current curves for each device shall be positioned to provide for maximum selectivity to minimize system disturbances during fault clearing, but still maintain a low incident energy level. Where selectivity cannot be achieved, the Engineer shall be notified as to the cause.

2. Time-current curves and points for cable and equipment damage.

3. Circuit interrupting device operating and interrupting times.

4. Indicate maximum fault values on the graph.

5. Sketch of bus and breaker arrangement.

2.06 ARC FLASH HAZARD ANALYSIS

A. The study shall be performed in accordance with the NEC and all applicable OSHA, ANSI, and IEEE standards.

B. The Contractor shall adjust all adjustable time-current devices such that the trip settings lower the arc flash exposure and minimizing the clearing time. However, the contractor shall adjust the time-current devices to avoid nuisance tripping.

C. The Contractor shall utilize fault current values from the short circuit analysis to determine the Incident energy, limited approach boundary, restricted approach boundary, prohibited approach boundary and appropriate PPE required.

D. The Contractor shall provide project specific arc-flash labeling. The arc-flash labeling shall be placed on the outside of the cover of the panelboard, switchboard, distribution panel, VFD, and all electrical panels, etc. such that it can be read without opening the electrical equipment. Mount arc-flash labels a maximum of 6'-6" AFF, include the housekeeping pad in the mounting height. The contractor shall provide arc-flash labeling on all existing panelboards, switchboards, distribution panel, etc. where breakers are added, or work is performed in or on the electrical equipment.

E. Arc Flash Labels shall be chemical resistant, UV resistant, water resistant, scratch resistant, and made of 3.0 mil vinyl tape as manufactured by DuraLabel, Brady or approved equal. The lettering shall be performed by thermal transfer print.

1. Arc Flash labels and label lettering shall be sized large enough to be legible at a distance outside the hazard area.

2. Arc Flash Labels shall be placed on the door(s) of the room if the hazard area reaches or extends beyond the electrical room door(s).

3. The arc flash label shall include a DANGER header when the incident energy is above 40cal/cm2, and a WARNING header for all other incident energy levels.

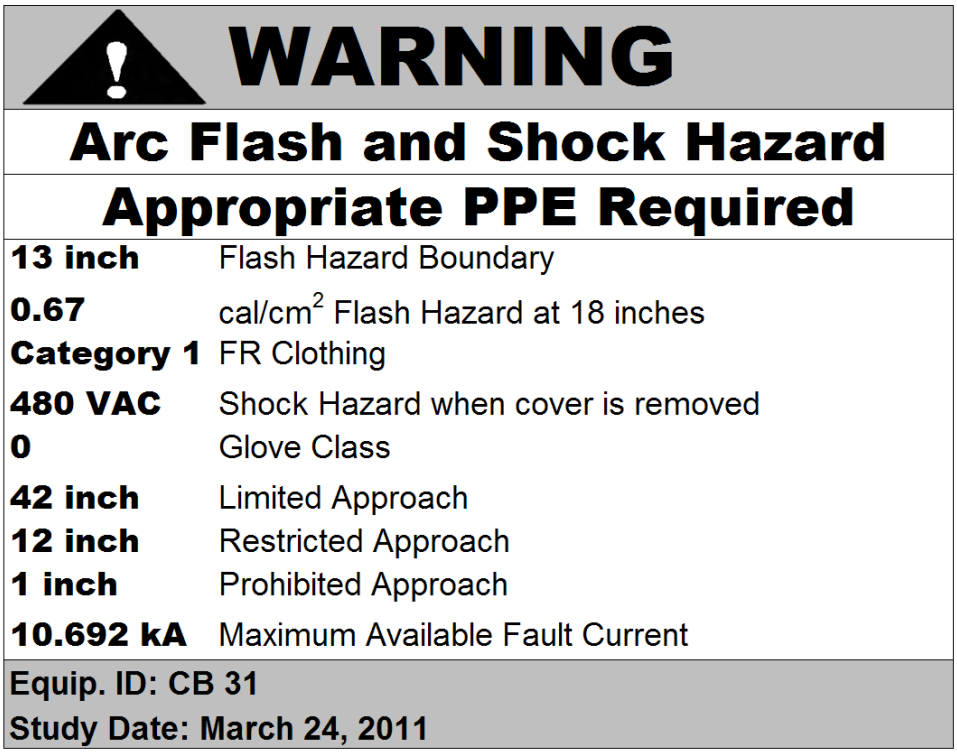
F. To ensure a safe workplace, and that the labeling meets NEC, OSHA, IEEE, ANSI and NFPA requirements, use specialized arc flash software to calculate protection boundaries. These protection boundaries shall include the Flash Protection Boundary, Limited Approach Boundary, Restricted Approach Boundary and the Prohibited Approach Boundary.

G. Arc flash labels shall be provided all the way down to the 120/240V, 208Y/120V panelboards.

H. The arc-flash analysis shall be based on calculated fault from the Short Circuit Study at each respective bus. The arc-flash software program shall be used to calculate the available arcing fault at each bus in the system, the resultant flash protection boundary based on the applicable protective device operating times and the associated incident energy that workers may be exposed to at the specified working distances.

I. The report shall include the following information: Arc-flash evaluation table, arc-flash and shock hazard label definitions, arc-flash evaluation information, arc-flash and shock hazard labels and definitions of terms used in the arc-flash hazard analysis.

J. Arc Flash labels shall be like the following example:



K. All values shown on the example label shall be the calculated values for the equipment that the label is to be placed.

2.07 LOAD FLOW STUDY

A. SCOPE: Determine the active and reactive power, voltage, current, and power factor throughout the electrical system. Provide an analysis of all possible operating scenarios.

B. PROCEDURE: The load flow study shall be performed in accordance with the recommended practices and procedures set forth in IEEE 399.

C. STUDY REPORT: Results of the load flow study shall be summarized in a final report containing the following items:

1. Basis, description, purpose, and scope of the study.
2. Tabulation of data used to model the system components and a corresponding one-line diagram.
3. Description of scenarios evaluated and the basis of each.
4. Tabulation of power and current flow versus equipment ratings. The tabulation shall identify percentage of rated load and the scenario for which the percentage is based. Overloaded equipment shall be clearly noted.
5. Tabulation of system voltage versus equipment ratings. The tabulation shall identify percentage of rated voltage and the scenario for which the percentage is based. Voltage levels outside the ranges recommended by equipment manufacturers, IEEE C84.1 or other appropriate standards shall be clearly noted.
6. Tabulation of system real and reactive power losses with area of concern clearly noted.

7. Conclusions and recommendations.
8. Load flow study shall be done for all different possible operating scenarios – off normal power, off generator power, off emergency circuit, etc.
9. Provide one-line diagram showing voltage at all major busses down to 120/240V, 208Y/120V panelboards.

2.08 MOTOR STARTING STUDY

A. The motor starting study shall provide an evaluation of the electrical power system when starting the motors for all operating scenarios. The motor starting study shall evaluate all different possible operating scenarios. Contractor shall coordinate with the equipment manufacturer and obtain all data required to perform the motor starting analysis. The preliminary starting analysis shall determine the maximum inrush allowed when starting the motors to not drop out the Spillway loads under the worst operating conditions.

B. Scope:

1. Contractor shall provide a motor starting/load flow study for the work performed at the Spillway. The study shall evaluate all operating scenarios. See electrical plans for detailed one-line diagram of the electrical distribution system. The study shall show at what setting each starter shall be set at so that when the largest motor is started across the line under the worst case conditions meets or exceeds the voltage flicker requirement of the local Utility and does not drop out the existing pump station loads. The Contractor shall coordinate with the Utility for all voltage flicker requirements and is responsible for obtaining all pertinent data from the utility and other equipment manufacturers to perform the study.
2. Contractor shall obtain any information required for the motor starting/load flow study including utility available fault current, utility system impedance, motor data (i.e., sub transient reactance, etc.), transformer data (i.e. impedance, X/R, etc.), cable data, etc.
3. The study shall be submitted to the Engineer and approved prior to final approval of the electrical equipment shop drawings and release of any electrical equipment for manufacturing.
4. The study shall include as a minimum the following:
    a. Single line diagram
    b. Bus Voltage and power flow
    c. Information on the computer program used for the study and shall include a general discussion of the procedure, items, and data considered in preparing the study.
    d. Description and analysis of all results.
    e. Suggested changes to the equipment selection that will result in improved system performance.

END OF SECTION

26 22 13 LOW VOLTAGE DISTRIBUTION TRANSFORMERS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install transformers. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE

A. Transformers shall comply with the specifications and shall be produced by the following Manufacturers:

1. Cutler-Hammer
2. GE by ABB
3. Square D

B. All others shall submit qualifications to the Owner and the Engineer for review and approval prior to bid submittal no later than one week after bid advertisement date. Any submittals after this time period shall not be evaluated. Qualifications shall include equipment manufacturer who have had at least 10 years of successful experience in providing equipment for similar projects with a generator and pump station configurations. Qualifications shall include a list of similar projects within the last 5 years with the name of the project and contact information of the Owner.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Bill of Material
2. Equipment Data Sheets showing impedance weights, dimensions, etc. for each transformer.
3. Product data on specified product documenting the following:
    a. Dimensions
    b. Weight
    c. KVA
    d. Voltage
    e. % Impedance
    f. Magnetizing current magnitude and duration
    g. Taps
    h. Insulation Class
    i. Sound Level

j. Wiring Diagram

k. Recommended upstream overcurrent protection – fuse size/and or breaker size.

l. Installation Instructions

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

ANSI/IEEE C57.96	Distribution and Power Transformers, Guide for Loading Dry-Type appendix to ANSI C57.12 standards
ANSI/IEEE C89.2	Dry Type Transformers for General Applications
IEEE C57.12.01	General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and / or Resin-Encapsulated Windings
IEEE C57.12.91	Test Code for Dry-Type Distribution and Power Transformers UL 506, Specialty Transformers
NEMA/ANSI ST20	Dry type transformers for General Applications
IEEE	Institute of Electrical and Electronic Engineers
NEMA TR1	Transformers, Regulators and Reactors
NEMA TP-1 2002	Guide for Determining Energy Efficiency for Distribution Transformers

2.00 PRODUCTS

A. DRY TYPE TRANSFORMERS

1. Provide dry type, 3-phase, delta wye connected transformers with KVA rating as required.

2. Transformers shall be suitable for indoor or outdoor installation as indicated on the plans, or as required by conditions. Transformers 75 KVA and less shall be suitable for floor, wall or trapeze mounting. Transformers larger than 75 KVA shall be suitable for floor or trapeze mounting.

3. Transformer shall be enclosed in a steel enclosure with covers secured with captive type hardware. Transformer shall be cooled by natural convection of air. The transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with a gray baked on enamel.

4. The average audible sound level shall not exceed 50 DB for transformers rated at 75 KVA and below, nor 60 DB for transformers rated above 75 KVA, when measured in accordance with NEMA Standard TR1.

5. The percent impedance for transformers shall not exceed 4.6 for up to 112 1/2 KVA 6 for 150 KVA to 750 KVA.

6. The transformers shall have the following characteristics:

   a. Class H insulation

   b. 150-degree Centigrade temperature rise rating at 40 degrees C ambient at full rated load.

c. Compartment for primary and secondary connections.

d. Transformer coils shall be of continuous copper wound construction with terminations brazed or welded. Coils shall be impregnated with non-hygroscopic, thermosetting varnish.

e. The maximum temperature of top of the enclosure shall not exceed 50 degrees C rise above a 40 degrees C ambient.

f. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible copper grounding conductor sized in accordance with applicable NEMA, IEEE, or ANSI standards.

g. Transformers shall have two (2) 2-1/2% full ampacity taps below and two (2) 2-1/2% taps above rated voltage in primary.

h. The basic impulse level shall be 10 KV for transformers less than 30 KVA, 30 KV for transformers 300 KVA and larger.

i. Transformer primary and secondary windings shall be copper. Aluminum windings shall not be permitted.

j. Transformers shall have efficiencies in accordance with NEMA TP-1. Provide written documentation as part of submittal process stating this and showing actual transformer efficiencies.

7. Three-phase transformer efficiency, total losses, shall not exceed losses @ 35% and 75°C per the NEMA Premium program tested per 10 C.F.R. Part 431 ("Test Procedures for Distribution Transformers"). Shall not exceed

   a. 15 kVA: 97.88% 112.30 W; 121.28 W

   b. 30 kVA: 98.24% 185.52 W; 200.35 W

   c. 45 kVA: 98.38% 256.42 W; 276.93 W

   d. 75 kVA: 98.59% 362.89 W; 391.92 W

   e. 112.5 kVA: 98.73% 500.31 W; 540.33 W

   f. 150 kVA: 98.80% 576.14 W; 622.22 W

   g. 225 kVA: 98.95% 764.14 W; 825.26 W

   h. 300 kVA: 99.02% 1010.010 W; 1090.81 W.

3.00 EXECUTION

3.01 LOCATION

A. Electrical Contractor to verify proper location for the unit.

B. The transformer shall be installed in a location where the sides with ventilated openings are a minimum distance of six inches from noncombustible structures or equipment to ensure adequate air circulation

3.02 INSTALLATION

A. Set the transformer plumb and level. Provide solderless lug bonding connection on the inside of the transformer enclosure in accordance with the NEC. Make primary and secondary connections with liquid tight flexible metal conduit to isolate transformer noise from the building structure or conduit system.

B. When final connection has been made, check secondary voltage at dry transformers and make tap adjustments required to obtain correct voltage.

C. Perform the following isolation procedures in addition to those provided by the transformer Manufacturer. Provide pad-type vibration isolators or waffle pads sized to load 50 pounds per square inch. Install one (1) at each corner of the transformer at floor mount or trapeze installations. Locate pads between hanger and wall for wall hung installations

D. For critical installations, spring type isolation may be required by the Engineer consisting of steel, spring-type isolators, sized for 1/2" deflection based on the weight of the transformer. Install at each corner or in hanger rods so that vibration is not transmitted to the building structure.

E. Secure transformer to concrete base according to manufacturer's written instructions.

F. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.

3.03 CONNECTIONS

A. Ground equipment according to Section 26 05 26, “Grounding & Bonding for Electrical Systems”.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

C. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.04 FIELD QUALITY CONTROL

A. Inspect installed dry type transformers for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible mechanical and electrical connections with calibrated torque wrench. Minimum acceptable values are specified in manufacturer's instructions.

3.05 CLEANING

A. Repaint scratched or marred exterior surfaces to match original finish.

3.06 TESTING

A. Testing: All testing required shall be per Specification 26 01 26 “Testing of Electrical Systems”.

B. Transformers furnished to this specification shall receive the following production tests:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS for dry-type, air-cooled, low-voltage transformers. Certify compliance with test parameters.
2. Applied Potential.
3. Induced Potential.
4. No Load Losses.
5. Voltage Ratio.
6. Polarity.
7. Continuity

C. Manufacturer shall perform the following additional tests on units identical to the design type being supplied to this specification. Manufacturer shall provide on request test data sheets to prove performance of these tests.

1. Sound Levels
2. Temperature Rise Tests
3. Full-Load Losses
4. Regulation
5. Impedance

3.07 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

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

END OF SECTION

26 24 16.02 LIGHTING AND BRANCH PANELBOARDS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals necessary to install lighting and branch panelboards. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”. Contractor/panelboard mfgr shall field verify existing installations where panelboards are being replaced in the Spillway Control Room and determine space available for new panelboards. This verification shall happen before official panelboards are submitted for the Engineer’s review.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

A. Panelboards shall comply with the specifications and shall be by the following Manufacturers:

1. Eaton
2. GE by ABB
3. Square D

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Shop Drawings:
    a. Bill of Material
    b. Front Elevation with dimensions
    c. Assembly ratings including short circuit ratings, continuous current and voltage
    d. Cable terminal sizes
    e. Cut sheet on circuit breakers and surge protective devices
    f. Time current curves for breakers.
    g. Contractor/panelboard manufacturer shall provide written verification that proposed panels will fit in existing space in Spillway Control Room.

1.04 STANDARDS

A. Circuit breakers, molded case, and branch circuit shall be in accordance with the applicable provisions of the following standards as if written here in their entirety:

1. Fed. Spec. W-C-375
2. NEMA AB1 Molded Case Circuit Breakers and their application.
3. NEMA PB1 Panelboards

1.05 DELIVERY AND STORAGE

A. Equipment shall be handled and stored in accordance with the manufacturer's instructions. Equipment shall be protected from damage.

1.06 WARRANTY

A. The manufacturer shall warrant the equipment to be free from defects for 1 year.

1.07 QUALITY ASSURANCE

A. Manufacturer shall be ISO 9001 2000 or later certified.

B. Manufacturer shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

2.00 PRODUCTS

2.01 PANELBOARDS

A. Panelboards shall consist of a box, front, interior and circuit protective devices and shall be manufactured in accordance with NEMA PB1 and bearing the applicable U.L. labels.

B. Panelboards shall be four wires, three phase as shown in the plans or required. Panelboards shall be NEMA 12 for indoor spaces and suitable for surface or recessed mounting – field verify existing conditions where panelboard will be installed. Panelboards shall contain sequence style busing and full capacity neutral, composed of an assembly of bolt-on, molded case, automatic breakers with thermal and an instantaneous, magnetic trip in each pole and a trip-free position separate from either the "On" and the "Off" positions. Two (2) and three (3) pole circuit breakers shall simultaneously open all poles. The use of metal clips tying single pole circuit breakers together to make a multi-pole breaker shall not be allowed. Circuit breakers, molded case and branch circuits shall be in accordance with Fed. Spec. W-C-375.

C. The voltage rating, phase, number of wires and ampere rating shall be as indicated and scheduled on the plans.

D. The panelboard box shall be fabricated of code gauge, steel in accordance with U.L. standards and have turned edges around the front for rigidity and frontal clamping. Provide standard knockouts on the panel enclosures.

E. The panelboard front shall be fabricated of sheet steel and finished with a baked on gray enamel over a rust inhibitor. Each front shall have a door mounted on semi-concealed hinges with a cylinder lock, an index card and a card holder. Panelboard locks shall be master keyed, with two (2) keys furnished for each panelboard. Index cards shall be properly typewritten.

F. The interior of the panelboard shall consist of a factory-assembled, rigid frame supporting the rectangular bus, the mains and the neutral bar.

G. All busing – phase, neutral and ground shall be tin-plated copper and arranged for sequential phasing throughout. The bus bar shall be sized so that the temperature rise is

limited in accordance with NEMA standards. The insulated neutral bar shall be located at the opposite end of the structure from the mains.

H. Panelboards shall have either solderless lugs or a main circuit protective device as scheduled. Each enclosure shall have grounding lugs and uninsulated equipment grounding terminals.

2.02 CIRCUIT BREAKERS

A. Panelboards shall be equipped with circuit breakers.

B. Circuit breakers shall be molded case, bolt in type.

C. Single pole circuit breakers serving fluorescent lighting loads shall have the SWD marking. Circuit breakers serving air conditioning branch loads shall be U.L. listed as type HACR.

D. Each circuit breaker used in the panelboards shall have an interrupting capacity of not less than the RMS symmetrical rating indicated on the plans for that panelboard.

E. Circuit breakers shall be manufactured by the panelboard manufacturer.

F. The panelboard and circuit breaker interrupting capacities and rating shall be equal to or greater than the fault currents available to each panelboard and as shown on the panelboard schedules in the plans. Series rating of breakers shall not be permitted.

2.03 SURGE PROTECTION DEVICES

A. Surge Protection Device Description: IEEE C62.41-compliant, internally mounted, wired-in, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, UL 1449, third edition Type2, short-circuit current rating matching or exceeding the switchboard short-circuit rating, and with the following features and accessories:

1. Fuses, rated at 240-kA interrupting capacity.
2. Fabrication using bolted compression lugs for internal wiring.
3. Integral disconnect switch/circuit breaker.
4. Redundant suppression circuits.
5. Redundant replaceable modules.
6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
7. LED indicator lights for power and protection status.
8. Audible alarm, with silencing switch, to indicate when protection has failed.
9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
10. Four-digit, transient-event counter set to totalize transient surges.

B. Peak Single-Impulse Surge Current Rating: 240kA per phase, 120kA per mode.

C. Protection modes and UL 1449 3rd edition VPR for grounded wye circuits with 480Y/277V, 208Y/120V, three-phase, four-wire circuits shall be as follows:

1. Line to Neutral, Line to Ground, Neutral to Ground: 1200 V for 480Y/277V and 800 V for 208Y/120V.
2. Line to Line: 2000 V for 480Y/277V and 1200 V for 208Y/120V.

D. Protection modes and UL 1449 3rd edition VPR for 240V, three-phase, three-wire circuits shall be as follows:

1. Line to Line: 1200 V for 240V.
2. Line to Ground: 1200 V for 240V

3.00 EXECUTION

3.01 INSTALLATION

A. Install the panelboard in accordance with applicable codes at each location indicated on the plans. Provide filler plates for unused spaces in the panelboard. All labeling shall be in accordance to Section 26 05 00, “Common Work Results for Electrical”.

B. Mount panelboard with 1/4” spacers off walls.

C. At the end of the project provide typed panelboard schedules for all panelboards.

D. NAMEPLATES:

1. For indoor applications with Air Conditioning: Plastic, white 1" letters on black background, on the front of each door on the switchgear; identifying the compartment contents for each compartment.
2. All other applications: Plastic, white 1" letters on black background, on the front of each door on the switchgear; identifying the compartment contents for each compartment.
3. Attach nameplates with a stainless steel screw and nut at each end of the nameplate. Adhesive backed nameplates shall not be installed.

END OF SECTION

26 27 26 WIRING DEVICES

1.00 GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment and incidentals necessary to install wiring devices. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

D. Products shall comply with the specifications and shall be by the following Manufacturers:

1. Hubbell
2. Leviton
3. Pass & Seymour

1.03 SUBMITTALS

Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

A. Shop Drawings for Wiring Devices: Cut sheets of all devices indicating model being provided, NEMA configuration, rating, color, etc.

1.04 STANDARDS

The applicable provisions of the following standard shall apply as if written here in its entirety:

NEMA WD-1	General Color Requirements for Wiring Devices
NEMA WD-6	Wiring Devices – Dimensional Requirements
UL 943	Ground-Fault Circuit-Interrupters
NFPA 70	National Electrical Code

2.00 PRODUCTS

2.01 MANUFACTURED PRODUCTS

A. WALL SWITCHES: For general use, totally enclosed industrial type, specification grade, rated for 120/277 VAC and 20 amps. Approved wire connection to switches shall consist of inserting wire into back wiring hole and tightening terminal screw until wire is tightly griped by clamping mechanism inside switch body. Side wiring shall not be allowed. Switches installed in hazardous areas shall be explosion proof type in accordance with the NEC.

B. MOTOR RATED SWITCHES: HP rated switches approved for motor control or disconnect service when controlling or disconnecting motor loads more than 1/4 HP; 20-amp switches for loads exceeding 10 amps.

C. WEATHERPROOF SWITCHES: Fitted with a single switch as specified, and weatherproof cover with spring door cover; gray in color for all areas.

D. RECEPTACLES: For general use shall be U.L. approved, hospital grade heavy duty duplex grounding type 20 ampere 125-volt heavy duty phosphor bronze contacts. Terminal screws shall be large head, deep slotted #8-32 brass, backed out, color coded for polarity identification, and shall accept up to 10 AWG wire. Side wiring shall not be allowed.

1. GROUND FAULT CIRCUIT INTERRUPTING, INDOOR: GFCI receptacle shall include visible indication of ground fault condition. Feed-through feature shall not be used. Install GFCI device at each location indicated. GFCI circuit breaker shall not be permitted.

2. ISOLATED-GROUND RECEPTACLES: Isolated-ground receptacles shall be listed and labeled as isolated-ground type. Receptacle body shall be orange in color. Isolation-ground shall be integral to the receptacle construction and not dependent on removable parts.

3. WEATHER RESISTANT RECEPTACLES: Weather resistant receptacles shall be listed as weather resistant type in accordance with the National Electrical Code.

4. WEATHERPROOF RECEPTACLES:

a. Weatherproof receptacles shall be hospital grade, 20 ampere, 125 volt and shall be listed as weather resistant type in accordance with the National Electrical Code and shall include a weatherproof device cover.

1). Weatherproof Duplex Receptacle: Provide GFCI duplex receptacle with weatherproof cover.

2). Weatherproof Single Receptacle: Provide a cast box fitted with a single receptacle and threaded cap with a weatherproof cover.

b. Weatherproof device covers shall have a NEMA 3R rating while receptacle is in use Heavy Duty rating with die cast metal construction as manufactured by Taymac Corporation, Tempe, Arizona or Thomas & Betts

E. SWITCH AND RECEPTACLE COVER PLATES: The cover plate color shall be gray for all areas, unless otherwise indicated or required by the NEC. Screw heads shall have color to match plate, 302/304 stainless steel. Provide telephone cover plates which are the same as above, except with a single bushed pole for the telephone cable.

3.00 EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to ensure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.

4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Existing Conductors:

1. Cut back and pigtail, or replace all damaged conductors.

2. Straighten conductors that remain and remove corrosion and foreign matter.

E. Pigtailing all conductors is required. Outlet boxes shall be oversized to allow pigtailing. All wiring devices shall be wired using pigtails.

F. Terminate stranded wire with crimp on connectors.

G. Install receptacles and switches only in electrical boxes which are clean, free from excess building materials, dirt and debris.

H. Install switches, wall-mounted duplex receptacles and telephone outlets at the heights specified in Section 26 05 33.03, “Outlet Boxes”, unless indicated otherwise on the plans.

I. Switches installed at one (1) location shall be ganged together under one (1) cover plate.

J. Sharing of neutrals is not allowed.

K. Through on wiring at receptacles is not allowed.

3.02 FIELD QUALITY CONTROL

A. Test wiring devices to insure electrical continuity of grounding. Energize the circuit to demonstrate compliance with the requirements.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 108 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION

26 28 13 FUSES

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches and enclosed controllers.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, and descriptions of individual components. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.

b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.

3. Current-limitation curves for fuses with current-limiting characteristics.

4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.

5. Coordination charts and tables and related data.

B. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.

2. Current-limitation curves for fuses with current-limiting characteristics.

3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.

4. Coordination charts and tables and related data.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.05 COORDINATION

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

1.06 EXTRA MATERIALS

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

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

2.00 PRODUCTS

2.01 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Mersen
4. Littelfuse, Inc.

2.02 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Motor Branch Circuits: Class RK1, time delay.
2. Other Branch Circuits: Class J, time delay.
3. Control Circuits: Class CC, time delay.
4. Disconnect switches.

3.03 INSTALLATION

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

3.04 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch.

END OF SECTION

26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1.00 GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment and incidentals necessary to install disconnects. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

Disconnects shall comply with the specifications and shall be by the following Manufacturers:

A. Eaton

B. GE by ABB

C. Square D

D. No Approved Equal

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Shop Drawings:

a. Product Data Sheets for Disconnects and Circuit Breakers.

b. Complete rating

c. Short circuit withstand ability of bus and lowest rated device

d. Overall outline dimensions including the space available for conduit

e. Conduit entry and exit points clearly showing dimensions of entry and exit points. Provide a detailed bottom view showing how conduits penetrate the bottom of the enclosure. Coordinate with the Electrical Contractor on this prior to submitting information to the Engineer.

f. Overall weight of line-up and each shipping split

g. Complete bill of materials with cut sheets on all major equipment clearly identifying exact model numbers of each component.

h. Device description

i. Time current curves for all circuit breakers and fuses.

j. Where fused disconnect switches and fused manual transfer switches are shown on the plans, provide detailed list of specific disconnect switch and the fuse type and size being provided in switch. Provide cutsheet and time current curve for each fuse.

2. O&M Manual

a. Operation and maintenance manuals shall contain the shop drawing submittals, final drawings with any changes made during start-up and maintenance procedures.

b. Operation and maintenance manuals shall include warranty information as well as a warranty information page that shall include information on the warranty start and end date as well as contact information for service.

1.04 STANDARDS

The applicable provisions shall apply as if written here in their entirety:

A. ANSI/UL - 198E

B. NEMA RS1

C. Fed. Spec. FS-WS-865

2.00 PRODUCTS

2.01 MANUFACTURED PRODUCTS

A. DISCONNECT SWITCHES:

1. Class "R" or non-fusible; of the required ampere rating, or as indicated on the plans; heavy duty, either single throw or double throw (as indicated in the plans) quick-make, quick-break, 3-phase, 3-pole or 4 pole switches as shown in the plans, unless otherwise indicated.

2. Manual transfer switches – fused and non-fused.

3. Service entrance rated switches.

4. Enclosure: NEMA 4X, 316 Stainless Steel for exterior installations not exposed to a hazardous location. Furnish enclosures with interlocking covers with maintenance defeat feature and external front-operated flange-mounted switch levers. Disconnects shall have provisions for the use of three (3) safety padlocks in the "Off" position. Furnish horsepower rated switches for motor circuits. The fuse interrupting rating shall be 65,000 rms amperes.

B. CIRCUIT BREAKERS:

1. Enclosure: NEMA 1 for indoor areas or NEMA 4X, 316 stainless for outdoor areas or wet areas.

2. Interrupting rating shall be 65,000 rms amperes. Refer to plans for circuit breaker sizes required.

3.00 EXECUTION

3.01 INSTALLATION

Install disconnect switches as required by the National Electrical Code. Install fuses in fusible disconnect switches.

END OF SECTION

26 29 13 ENCLOSED CONTROLLERS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals to install combination motor starters. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”. Section includes the following enclosed controllers rated 600 V and less.

1.02 QUALITY ASSURANCE - ACCEPTABLE MANUFACTURERS

Enclosed Controllers shall comply with the specifications and shall be by the following Manufacturers:

A. Allen Bradley

B. Eaton

C. GE by ABB

D. Square D

E. No Approved Equal

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in and marked for intended location and application.

B. Comply with NFPA 70.

C. Coordinate with equipment suppliers for actual motor data – HP, voltage, amps, etc, to properly size controller (starter) and overloads.

1.04 SUBMITTALS

Submittals for 26 29 13, “Enclosed Controllers” shall not be combined with any other submittals. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

A. Shop Drawings: For each enclosed controller.

1. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.

2. Catalog cut sheets of major components. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes. Data sheets shall clearly identify the make and model number of the equipment being provided.

3. Drawings shall show the following:

a. Each installed unit's type and details.

b. Factory-installed devices.

c. Nameplate legends.

d. Short-circuit current rating of integrated unit.

e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.

f. Project specific wiring diagrams/control schematics: For power, signal, and control wiring. Labels on the control schematic for control relays, timing relays, level instruments, indication lights, etc. shall correspond to equipment tag/labels indicated on the Control Schematic included in the plans. Include a label above each timing relays indicating the range and set points for that timing relay.

g. Project specific layout of front of controller clearly identifying the location of all panel mounted devices, and clearly indicating the maximum mounting height of devices on doors.

h. Terminal strip layout clearly showing all field connections. The terminal strip layout shall also include a label next to each connection indicating signal description.

i. Conduit entry and exit locations. Conduit entry and exit points clearly showing dimensions of entry and exit points. Provide a detailed view showing how conduit penetrate the bottom/side of panel.

j. Installation weights.

k. Cable terminal sizes.

l. Internal component layout diagrams showing the front view of inside the panel (with the doors off) clearly identifying all devices and power equipment.

4. Complete bill of materials with model numbers listed for individual components.

5. Data sheets of miscellaneous electrical equipment clearly identifying make and model being provided.

6. Warranty Information.

7. Spare Parts List.

8. Any deviations from the specifications should be clearly identified on a separate sheet of paper in the shop drawing submittal.

1.05 OPERATION AND MAINTENANCE MANUALS:

A. Operation and maintenance manuals shall contain the shop drawings, submittals, spare parts lists, schematics, and maintenance procedures.

B. Manuals shall also incorporate appropriate final certified shop drawings. Manuals may be manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material.

C. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

E. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

B. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 122 deg F (50 deg C).

2. Altitude: Not exceeding 3300 feet.

B. HORSEPOWER RATING:

1. The motor size indicated on the Plans is the maximum size horsepower expected at each of the sites. The Contractor shall furnish properly sized motor control equipment suitable for use with the maximum expected motor horsepower for each site. Field verify exact motor horsepower for each site and properly size overloads and MCP accordingly. If actual motor horsepowers differ from the Plans, the Contractor shall obtain assistance from the Engineer in determining whether hardware and wiring changes are necessary. The Contractor shall provide all components and wire of the proper size. Contractor shall field verify all existing motor data.

C. OPERATING VOLTAGE: The equipment shall be designed and arranged for operation on 480 Volt, 3 phase, 60 Hertz or 120V, 60 Hertz. See plans for more details.

D. CONTROL POWER: Control power shall be 120 VACS from a control transformer located in each combination starter. Extra control transformer VA capacity shall be furnished for powering the motor space heater in the motor which the combination starter serves. This extra VA capacity shall be in addition to the VA required for the other control components powered by the control transformer. The following is the amount of extra VA capacity which shall be furnished:

COMBINATION NEMA SIZE	CONTROL TRANSFORMER EXTRA VA CAPACITY
size 1	100
size 2	200
size 3	300
size 4	500

COMBINATION NEMA SIZE	CONTROL TRANSFORMER EXTRA VA CAPACITY
size 5	750
size 6	1000

This extra VA capacity shall be furnished in each combination starter regardless of where the motor space heater received its power and regardless of whether the motor has a space heater or not.

E. INTERRUPTING RATING: Both circuit breakers and combination starters as complete units shall be rated for 65,000 Amps Interrupting Capacity (AIC).

F. ENCLOSURES: NEMA 4X, 316 stainless steel for all outdoor locations and NEMA 12 for Spillway Control Room.

1.08 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.09 SPARE PARTS

A. Furnish spare parts that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

2. Indicating Lights: One of each type and color installed.

3. Five spare relays and timers of each type used.

2.00 PRODUCTS

2.01 COMBINATION STARTER

A. The combination starter shall include a motor circuit protector (MCP) type circuit breaker or a thermal magnetic type circuit breaker as indicated on the Plans. MCP's shall be magnetic trip only with adjustable magnetic trip limited to 1300% of motor nameplate full load current to comply with NEC requirements. Devices shown on the schematic and not specifically designated as being elsewhere shall be installed inside the combination starter.

B. Combination starter doors shall be interlocked mechanically with the circuit breaker operator mechanism to prevent unintentional opening of the door while the circuit breaker is in the closed position. The circuit breaker operator mechanism shall be mounted on the stationary part of the enclosure and not on the door of the enclosure. The circuit breaker operator mechanism shall indicate "ON" and "OFF" with the door open or closed. The

circuit breaker shall be manually operated, resettable after trip from the operator mechanism handle. The operating handle shall clearly indicate whether the circuit breaker is "ON" or "OFF", or "TRIPPED". Means shall be provided to lock each operator mechanism handle in the "OFF" position and to close the door. Means shall be provided for releasing the interlock for intentional access to the interior at any time and intentional application of power, if desired, while door is open. Padlocking arrangements shall permit locking the disconnect device "OFF" with at least three padlocks with door closed or open.

C. The combination starter shall have a magnetic starter contactor. The magnetic starter contactor shall be NEMA rated and NEMA 1 magnetic starter contactors shall be the minimum size allowed. Magnetic starter contactors shall have renewable contacts and a renewable coil which shall allow each to be replaced without replacing other parts of the magnetic starter contactor. Magnetic starter contactors shall have a maximum pick up voltage of 71% of nominal coil voltage and a maximum drop out voltage of 59% of nominal coil voltage.

D. Each magnetic starter shall have three (3) external manual reset thermal overload relays of either the bimetallic type or the melting alloy type. Overload relays shall be either ambient compensated or ambient insensitive. Overload relay heaters shall be Class 10 for submersible pump motors and hermetically sealed motors and shall be Class 20 for all other motors. Overload relay heaters shall be selected to produce an overload trip at no more than the following percent of the motor nameplate full load current rating:

Motors with a marked service factor not	
less than 1.15	125%
Motors with a marked temperature rise of	
not over 40°C	125%
All other motors	115%

E. Overload relays shall be reset from outside the enclosure with an insulated bar or button. Auxiliary contacts shall be furnished on the circuit breaker operating mechanism, the starter contactor and on the overload sensing unit as shown on the plans.

F. Controls and lights shall be heavy duty oil tight construction. Devices installed in the combination starter or on the door of the combination starter shall be completely factory wired with connections to external devices brought to a terminal strip installed in the starter. No field wiring shall be permitted except for connections to remote devices from the terminal strip. A physical wiring diagram shall be provided on each enclosure door and shall be protected to remain intact and legible for the service life of the equipment. Control devices shall be identified as to type and manufacturer.

G. Control relays, timing relays, control transformers, control circuit fuse blocks, etc., shall be grouped in the corresponding combination starter with control wiring kept as short as possible. Ample space shall be allowed between devices so that each component is completely accessible without removing any other device.

H. Wiring in the combination starter shall terminate on numbered terminal strips or power distribution blocks. No other wire connecting devices, including but not limited to wirenuts and split bolts, shall be allowed in the combination starter. Each combination starter shall be provided with an individual terminal strip for control wiring. Terminal strip metallic

materials shall be tinned copper. Power distribution blocks shall be tinned copper which is rated for termination of copper conductors.

I. Combination starter control wiring shall be 14AWG. Power wiring shall have black insulation and control wiring shall have purple insulation for ungrounded conductors and white insulation for grounded conductors. Combination starter wiring shall have copper conductors with MTW insulation only.

J. Where control transformers are indicated and unless shown otherwise, each starter shall contain a 480 to 120 volt fused control transformer with sufficient capacity for all the devices shown in the schematic. The control transformer shall have two (2) primary fuses, one in each primary lead and one secondary fuse in one of the secondary leads. The unfused secondary lead shall be grounded.

K. Each combination starter shall have an engraved plastic nameplate fastened to the outside of the unit door. Engraved plastic nameplates shall have .33" high white letters on a black background and attached with stainless steel screws. Wiring diagrams shall be provided on the inside of each compartment door and shall be protected so that they remain attached and legible for the service life of the equipment.

L. If any circuit breaker operating handle is more than 6'6" above the floor surface immediately in front of the combination starter, a supplementary operating device shall be attached to the operating handle. This supplementary device shall require a person to reach no more than 6'6" above the floor surface at any point of opening or closing the circuit breaker.

2.02 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Magnetic Controllers: Full voltage, across the line, electrically held.

1. Configuration: Nonreversing.

2. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.

a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

3. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.

4. Control Circuits: 120V ac; obtained from integral CPT, with primary and secondary fuses of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.

a. CPT Spare Capacity: 100 VA minimum.

5. Bimetallic Overload Relays:

a. Inverse-time-current characteristic.

b. Class 20 tripping characteristic.

c. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.

d. Ambient compensated.

e. Automatic resetting.

6. Solid-State Overload Relay:

a. Switch or dial selectable for motor running overload protection.

b. Sensors in each phase.

c. Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.

d. Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.

e. Analog communication module.

7. External overload reset push button.

C. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, overcurrent protective device, and disconnecting means.

1. MCP Disconnecting Means:

a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

c. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.

d. Current-limiting module to increase controller short-circuit current (withstand) rating to 65 kA.

2.03 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

B. IEC or dual rated NEMA/IEC equipment shall not be acceptable.

C. CONTROL RELAYS: Industrial type; contacts rated for 10 amps at 600 VACS; Square D Class 8501 Type X, Allen-Bradley Bulletin 700 type PK, or approved equal. Relays shall have the capability of having contact decks added in the field. Contacts shall be field convertible to normally open or normally closed. Coils and contacts shall each be replaceable without replacing any other part of the relay. Where control relays are indicated on the Plans, industrial control relays shall be furnished whether the relay coil is operated with 120 VAC or 24 VDC.

D. ELAPSED TIME METER: Yokogawa Type 240 or approved equal. The meter shall be of the non-reset type for totalizing of hours and operating on 120 or 240 VAC, 60 Hertz.

E. INDICATING LIGHTS, SWITCHES AND PUSHBUTTONS: Heavy duty and oil tight, Square D Class 9001 (30.5 mm) or approved equal. Devices shall match or exceed the rating of the

enclosure. Indicating lights shall be push-to-test (LED type) and shall be Square D SKT or approved equal.

F. CONTROL TRANSFORMER: Included in combination starter units with sufficient VA capacity for powering the devices shown in the control schematic; 480-to-120-volt transformer with a fuse in each primary leg and one (1) fuse in the secondary leg. The unfused secondary leg shall be grounded.

G. PHASE FAILURE RELAY: Phase failure relay shall be a 480VAC, 3-phase and be able to detect phase loss, low voltage and phase reversal with an automatic reset and output contacts. The phase failure relay shall be as manufactured by Time Mark model 258 or approved equal.

H. Space heaters, with N.C. auxiliary contacts, to mitigate condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings. Space heaters shall be thermostatically controlled and be power from internal power inside the enclosure.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Make electrical connections to equipment specified. Install equipment in accordance with the Manufacturer's recommendations and the plans. If neither are available, install the equipment using the best practices of the electrical industry and trade.

B. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 26 05 29, "Hangers and Supports for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

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

E. Comply with NECA 1.

3.03 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring in accordance with Section 26 05 53, “Identification for Electrical Systems”.

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved nameplate.
3. Externally visible, permanent nameplates shall be provided to identify each switch, indicating light, etc. Equipment and terminal blocks shall be suitably identified. This shall include items on the back side of doors and panel mounted items. Nameplates shall be black with white lettering and attached with stainless steel screws.
4. Factory installed conductors, control relays, timing relays, pilot devices, etc. shall be labeled at the factory.

3.04 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers 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 with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.05 FIELD QUALITY CONTROL

A. Upon completion of the installation, perform continuity tests and functional checkout to assure the proper operation of all equipment.

B. Acceptance Testing Preparation:

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

C. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Contractor/Owner before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed controllers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.06 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

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

D. Set field-adjustable circuit-breaker trip ranges.

3.07 TRAINING

A. Provide manufacturer's services for training of personnel in operation and maintenance of the enclosed controller furnished under this Section.

B. The training for each type of equipment shall be for a period of not less than one (1) two-hour class. Prior to the warranty expiring, the panel manufacturer shall provide an additional 2-hour training class on the operation and maintenance of the enclosed controller furnished under this section.

C. The cost of training program to be conducted with Owner's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

D. Provide detailed O&M manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.

F. The Owner reserves the right to videotape the training sessions for the Owner's use.

3.08 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.

B. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

END OF SECTION

26 29 87 ELECTRICAL CONTROL PANELS

1.00 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install functional control panels to manually or automatically operate control systems as specified in the detailed requirements of this Section, and logic and schematics as shown on the Electrical Drawings.

B. Submittals for Electrical Control Panels, specified as Control Panels by the Electrical or Mechanical equipment manufacturer, shall be submitted under this Section of the Specifications.

C. Electrical control panel in the plans is referred to as the Gate Control Panel and Relief Wells No.4 and No.10 Level Control Panel.

D. Prior to submitting formal submittal on Gate Control Panels, Contractor and panel manufacturer shall visit Spillway and field verify exiting controls of panels. Controls shall match that of existing. Contractor shall provide in writing as a formal submittal that existing panel controls have been field verified.

E. Refer to Specification 26 29 13, Enclosed Controllers, for requirements of starters to be used in Control Panels.

F. Refer to Specification 40 90 01, Instrumentation, for level electrode relays and local panel level indicator to be used in Control Panels.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management”

B. Submittals shall also contain information on related equipment to be furnished under this Specification. Incomplete submittals not containing the required information on the related equipment will also be returned unreviewed.

C. The original equipment manufacturer shall create all equipment shop drawings, including all wiring diagrams, in the manufacturer's Engineering department. All equipment shop drawings shall bear the original equipment manufacturers logo, drawing file numbers, and shall be maintained on file in the original equipment manufacturer's archive file system. Photocopies of the Engineer's ladder schematics are unacceptable as shop drawings.

D. Submit to the Owner/Engineer, shop drawings and product data, for the following:

1. Product data sheets and catalog numbers for overcurrent protective devices, motor starters, control relays, control stations, meters, pilot lights, etc. The manufacturer's name shall be clearly visible on the each cut sheet submitted. List all options, trip adjustments and accessories furnished specifically for this project. Clearly mark each sheet to indicate which items apply and/or those items that do not apply.

2. Provide control systems engineering to produce custom project specific unit elementary drawings showing interwiring and interlocking between components and to remotely mounted devices. Include and identify all connecting equipment and remote devices on

the schematics. The notation "Remote Device" will not be acceptable. Show wire and terminal numbers. Indicate special identifications for electrical devices per the Drawings.

3. Equipment outline drawings showing elevation, plan and interior views, front panel arrangement, dimensions, weight, shipping splits, conduit entrances and anchor bolt pattern. Indicate all options, special features, ratings and deviations from this Section.
4. Project Specific Schematic diagram, including manufacturer's selections of component ratings, and CT and PT ratios.
5. Project Specific Power and control schematics including external connections. Show wire and terminal numbers, and color-coding.
6. Instruction and replacement parts books.
7. As-built final drawings.
8. Documentation that the panel assembly facility is a UL-508 certified panel shop.
9. Facsimile of the UL label that is to be applied to the completed panel.
10. Furnish complete Bill of Materials indicating manufacturer's name and part numbers.
11. Manufacturer's cut sheets for every component used in the panel assembly adequately marked to show the items being included. The manufacturer's name shall be clearly visible on the each cut sheet submitted.
12. Assembly ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
13. Major component ratings including:
    a. Voltage
    b. Continuous current
    c. Interrupting ratings
14. Cable terminal sizes.
15. Instruction and renewal parts books.

E. Factory Tests. Submittals shall be made for factory tests specified herein.

F. Field Test Reports. Submittals shall be made for field tests specified herein.

G. Operation and Maintenance Manuals.
    1. Operation and maintenance manuals shall include the following information:
        a. Manufacturer's contact address and telephone number for parts and service.
        b. Instruction books and/or leaflets
        c. Recommended renewal parts list
        d. Record Documents for the information required by the Submittals par graph above.

1.03 REFERENCE CODES AND STANDARDS

A. All products and components shown on the Drawings and listed in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):

1. NEMA Standard ICS 2 - 2000 Industrial Control and Systems
2. NFPA 70- National Electrical Code (NEC)
3. NFPA 70E- Standard for Electrical Safety in the Workplace
4. NFPA 79- Electrical Standard for Industrial Machinery
5. UL 508/508A -Industrial Control Enclosures

B. All equipment specified in this Section of the Specifications shall bear the appropriate label of Underwriters Laboratories.

1.04 QUALITY ASSURANCE

A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of five (5) years. When requested by the Owner/Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. The control panels shall be assembled in a UL-508 certified facility. A submittal of documentation certifying that the panel fabrication facility is a UL-508 certified facility is required. A UL label shall be affixed to the inside of the external door by the panel fabrication assembly. Submit a facsimile of the UL label in the submittal information.

C. All components and material shall be new and of the latest field proven design and in current production. Obsolete components or components scheduled for immediate discontinuation shall not be used.

D. Control Panels submitted shall fit within the space shown on the Drawings. Equipment which does not fit within the space is not acceptable.

E. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

F. Equipment components and devices shall be UL labeled wherever UL standards exist for such equipment. The completed control panel shall be UL Labeled in accordance with UL 508 and 508A and other applicable UL standards. The panel shall also be UL labeled for the environment in which it is to be placed. A UL label shall be affixed to the inside of the external door by the panel fabrication assembly. Submit a facsimile of the UL label in the submittal information.

1.05 JOBSITE DELIVERY, STORAGE AND HANDLING

A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment, an approved copy of all such submittals. Delivery of incomplete constructed equipment, onsite factory work, or failed factory tests will not be permitted.

B. Equipment shall be handled and stored in accordance with manufacturer's instructions. Two (2) copies of these instructions shall be included with the equipment at time of shipment and shall be made available to the Contractor and Owner/Engineer.

C. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Breakers and accessories shall be packaged and shipped separately.

D. Equipment shall be installed in its permanent finished location shown on the Drawings within seven (7) calendar days of arriving onsite. If the equipment cannot be installed within seven (7) calendar days, the equipment shall not be delivered to the site, but stored offsite, at the Contractor's expense, until such time that the site is ready for permanent installation of the equipment.

E. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during storage, and after equipment is installed in permanent location, until equipment is placed in service.

1.06 WARRANTY

A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for two years from date of final payment of the equipment containing the items specified in this Section. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Contractor at no expense to the Owner.

2.00 PRODUCTS

2.01 MATERIAL MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following material Manufacturers are acceptable:

1. General Electric Co./ABB
2. Eaton - Cutler-Hammer
3. Square D Co.
4. Allen Bradley

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Materials listed above are not relieved from meeting these Specifications in their entirety.

C. Refer to Specification 26 29 13 for requirements of starters to be used in Control Panels.

D. Refer to Specification 40 90 01, Instrumentation for level electrode relays and local panel level indicator to be used in Control Panels.

2.02 RATINGS

A. The service voltage shall be as specified and as shown on the Drawings. The overall short circuit withstand, and interrupting rating of the equipment and devices shall be 65,000 amperes RMS symmetrical at 480Y/277 Volts and 22,000AIC for 208Y/120 Volts. This includes all circuit breakers and combination motor starters. Systems of motor controllers employing series connected ratings for main and feeder devices shall not be used. Motor starter units shall be tested and UL 508A labeled for the specified short circuit duty in combination with the motor branch circuit protective device.

B. There shall be selective device coordination between the Main Breaker, Feeder Breakers and control circuit protective devices. When using a circuit breaker or fuses as a main protective device, the instantaneous trip levels of the main protective device shall be higher than the available fault current to the control panel. If fuses are utilized in the control panel design, the protective devices for 3 phase loads shall contain single phase protection of such equipment. If a fault occurs in the circuit of one load of a design with a backup load, the feeder protective device shall not remove both loads from the control system.

C. Use ground fault sensing on grounded wye systems.

D. The complete control panel assembly shall be UL certified or carry a UL listing for "Industrial Control Panels".

E. The control panel shall meet all applicable requirements of the National Electrical Code.

F. The control panel enclosure shall be NEMA rated as indicated in Section 26 00 00 of the Electrical Specifications.

G. Motor controllers, including associated devices, shall be designed for continuous operation at rated current in a 50 degree C ambient temperature unless noted otherwise. Panels located outdoors or in non-airconditioned spaces shall be rated for 50 degree C ambient temperature.

H. For additional ratings and construction notes, refer to the Drawings.

I. The Contractor shall install on each panel, an Arc Flash Warning Label listing the various Flash Hazard Protection Boundaries. Engineer to provide Arc Flash warning labels to Contractor to install.

2.03 CONSTRUCTION

A. General

1. Refer to Drawings for: actual layout and location of equipment and components; current ratings of devices, bus bars, components; protective relays, voltage ratings of devices, components and assemblies; and other required details.

2. Control units shall be arranged as shown on the Drawings.

3. Nameplates

a. External

1). Nameplates shall be engraved, laminated impact acrylic, matte finish, not less than 1/16-in thick by 3/4-in by 2-1/2-in, Rowmark 322402. Nameplates shall be 316 SS screw mounted to all enclosures except for NEMA 4 and 4X. Nameplates

for NEMA 4 and 4X enclosures shall be attached with double faced adhesive strips, TESA TUFF TAPE 4970, .009 X W', or equal. Prior to installing the adhesive nameplates, the metal surface shall be thoroughly cleaned with 70% alcohol until all residue has been removed. Epoxy adhesive or foam tape is not acceptable. Nameplates shall be black with white letters.

2). There shall be a master nameplate that indicates supply voltage equipment ratings, short circuit current rating, manufacturer's name, shop order number and general information. Cubicle nameplates shall be mounted on the front face, on the rear panel and inside the assembly, visible when the rear panel is removed.

3). Provide permanent warning signs as follows:

a). "Danger- High Voltage- Keep Out" on all doors.

b). "Warning- Hazard of Electric Shock - Disconnect Power Before Opening or Working on This Unit" on main power disconnect or disconnects.

b. Internal

1). Provide the panel with a UL 508A label.

2). Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification, corresponding to appropriate designations on manufacturer's wiring diagrams.

c. Special

1). Identification nameplates shall be white with black letters, caution nameplates shall be yellow with black letters, and warning nameplates shall be red with white letters.

4. Control Devices and Indicators

a. All operating control devices, indicators, and instruments shall be securely mounted on the panel door. All controls and indicators shall be 30mm, corrosion resistant, reinforced plastic, NEMA 4/4X/13. Auxiliary contacts shall be provided for remote run indication and indication of each status and alarm condition. Additional controls shall be provided as specified herein and as required by the detailed mechanical and electrical equipment requirements.

b. Indicator lamps shall be LED type. Unless otherwise shown on the Drawings, lens color shall be Red for ON or OPEN, Green for OFF or CLOSED, Amber for FAIL or ALARM, and White for POWER ON. For all control applications, indicator lamps shall incorporate a push-to-test feature.

c. Mode selector switches (HAND-OFF-AUTO, LOCAL-OFF-REMOTE, etc) shall be as shown on the Drawings. Units shall have the number of positions and contact arrangements, as required. Each switch shall have an extra dry contact for remote monitoring.

d. Pushbuttons shall be Red for START or OPEN, Green for STOP or CLOSE, mushroom Red for EMERGENCY STOP (Pull to Reset), and Black for RESET.

e. Furnish nameplates for each device. All nameplates shall be laminated plastic, black lettering on a white background, attached with stainless steel screws. Device mounted nameplates are not acceptable.

5. Control and Instrument Power Transformers

   a. Control power transformers shall be provided where shown on the Drawings. Transformer shall be sized for the entire load, including space heaters, plus 25% spare capacity, and shall be not less than 100VA.

   b. Control power transformers shall be 120 volts grounded secondary. Primary side of the transformer shall be fused in both legs. One leg of the transformer secondary shall be solidly grounded while the other leg shall be fused.

6. A failure alarm with horn and beacon light shall be provided when required or specified. Silence and reset buttons shall be furnished. Alarm horn and beacon shall be by Federal Signal; Crouse-Hinds, or equal, NEMA 4X for all areas except for NEMA 7 areas, which shall be NEMA 7/4X cast aluminum.

7. Where specified or shown on the Drawings, a six-digit, non-resettable elapsed time meter shall be installed on the face of each motor starter.

B. Enclosure Types

1. NEMA 7/4X, cast aluminum enclosures for indoor/outdoor use in hazardous (classified as Class 1, Division 1, Groups B, C and D), as defined in NFPA 70.

   a. Enclosures constructed for either indoor or outdoor use in hazardous (classified as Class 1, Division 1, Groups A, B, C, or as defined in NFPA 70. Boxes shall be copper-free aluminum, with stainless steel hinged cover, watertight ne-oprene cover gasket with stainless steel bolts. All penetrations shall be factory drilled and tapped. Enclosures shall be Type EJB Style Cas manufactured by the Crouse-Hinds Co.; Appleton Electric Co. or approved equal.

2. NEMA 4X Aluminum Enclosures where specifically shown on the Drawings.

   a. Enclosures shall be NEMA Type 4X of aluminum with mounting lugs or brackets made on the enclosure suitable for wall mounting. Enclosures shall not have holes or knockouts. Enclosures shall not be less than .080 in. thick, gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed, doors with handle latch, 3-point above 20" x 20". All enclosures shall have bonding provisions on door. Enclosures shall be ECL Series with Window Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

3. NEMA 4X Non-metallic enclosures, of fiberglass reinforced polyester, for Chlorine, Ammonia, Caustic and other Chemical Rooms. Fiberglass enclosures shall not be used in the presence of sodium hypochlorite nor shall they be used in outdoor applications.

   a. Enclosures shall be NEMA 4X, non-metallic construction. Non-metallic boxes shall have UV inhibitors, but not mounted in direct sunlight. Where clamp type latches are required, provide quick- release luggage type latches. All enclosures shall have foam-in-place gasketed doors with handle latch, 3-point above 20" x 20". All enclosures shall have bonding provisions on door. Enclosures shall be with Window

Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

4. NEMA 4X 316 Stainless Steel enclosures for all areas, unless specifically stated otherwise, or shown on the Drawings.

   a. Wall Mounted

      1). Enclosures shall be NEMA Type 4X of 316 stainless steel with mounting lugs or brackets made on the enclosure suitable for wall mounting. Enclosures shall not have holes or knockouts. Enclosures shall not be less than .080 in. thick, gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed doors with handle latch, 3-point above 20" x 20". Screw-clamp latches shall not be acceptable. All enclosures shall have bonding provisions on door. Enclosures shall be LHCXXXXXXSS6 Series with Hoffman APWKXXXXNFSS Window Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

   b. Free Standing

      1). Enclosures shall be NEMA Type 4X of 316 stainless steel, with lifting eyes, without knockouts or holes. Enclosures shall not be less than 12-gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed doors with handle latch, 3-point. All enclosures shall have bonding provisions on door. Enclosures shall be AXXXXXXFSSS6 Series with Hoffman APWKxxXXNFSS Window Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

5. NEMA 12 enclosures where specifically shown on the Drawings.

6. a. Wall Mounted

      1). Enclosures shall be of factory gray painted aluminum, with mounting lugs suitable for wall mounting. Enclosures shall not have holes or knockouts. Enclosures shall not be less than .080 in. thick, gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed doors with handle latch, 3-point above 20" x 20". All enclosures shall have bonding provisions on door. Enclosures shall be Comline Series with Hoffman APWKXXXXNFSS Window Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

   b. Free Standing

      1). Enclosures shall be of factory gray painted steel, with lifting eyes, without knockouts or holes. Enclosures shall not be less than 12-gauge metal. All enclosures shall have continuous hinged, foam-in-place gasketed doors with handle latch, 3-point. All enclosures shall have bonding provisions on door. Enclosures shall be AXXXXXXFS Series with Hoffman APWKXXXXNFSS Window Kit, where shown on the Drawings, as manufactured by Hoffman Engineering Co. or equal.

7. NEMA Types 1 or 1A enclosures will not be permitted, unless specifically stated in the Specification for the equipment, or shown on the Drawings.

8. All panels installed outdoors shall have a factory applied, suitable primer and final coat of weather-proof white paint.
9. Each enclosure shall incorporate a removable back panel, and side panels, on which control components shall be mounted. Back panel shall be secured to the enclosure with collar studs for wall mounted enclosures, and 316 SS hardware for free standing enclosures. The enclosure door shall be interlocked with the main circuit breaker by a door mounted operating mechanism. Back panel shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any components.
10. All enclosures shall be padlockable.
11. The enclosure outer door shall have a rear mounted pocket, containing laminated copies of the Control schematics.
12. Overload tables shall be laminated and adhered to the inside of the door.
13. A separate 120VAC Terminal Block and circuit breaker shall be provided for the panel.
14. Enclosure shall be provided with an enclosed switched LED light and separate 120 volt grounded duplex receptacle. Switch for light shall be mounted on inside of cabinet, easily accessible and come on/go off when door is opened/closed.
15. Acceptable cabinet manufacturers:
    a. Hoffman
    b. Hammond
    c. Rittal
    d. Approved Equal
16. A print pocket shall be provided in the panel and shall contain an 11" x 17" control schematic and an 11" x 17" wiring diagram or diagrams. The wiring diagram shall contain all wire numbers, device names and terminal numbers. Drawings shall be laminated in clear plastic for preservation of the drawings.
17. All equipment shall be mounted in such a manner that all maintenance may be accomplished with easy access through the cabinet doors

C. Environmental Conditioning
    1. Condensation Control
        a. A self-contained enclosure condensation heater with thermostat and fan shall be mounted inside the control panel, if panel is mounted outdoors or in a non-air-conditioned space.
            1). Enclosure heaters shall be energized from 120-volt, single-phase power supply and sized to prevent condensation within the enclosure.
            2). Locate enclosure heaters to avoid overheating electronic hardware or producing large temperature fluctuations on the hardware.
            3). Enclosure heaters shall have an internal fan for heat distribution and shall be controlled with adjustable thermostats. The thermostat shall have an

adjustment range of 40 degrees Fahrenheit to 90 degrees Fahrenheit. Provide a circuit breaker or fused disconnect switch within the enclosure.

4). Enclosure heaters shall be Hoffman type DAH or equal.

b. Strip heaters may be provided if they are 240 volts rated, powered at 120 volts AC, and do not have a surface temperature higher than 60°C. Strip heaters and thermostats shall be as manufactured by Chromolox or equal.

1). Strip heaters shall be Chromalox, Type OT, 1.5-in wide, 240 Volts, single phase, 150 watts, energized at 120 volts, with rust resisting iron sheath, Catalog No. OT-715, Product Code No. 129314, or equal. Provide sufficient wattage in heaters to prevent condensation should the interior temperature of the enclosure drop below the dew point.

2). A control thermostat mounted inside the control Panel shall be Chromalox, Type WR, single stage, Catalog No. WR-80, Product Code No.263177, or equal.

3). The strip heater terminals shall be guarded by a protective terminal cover.

4). High temperature connecting lead wire shall be used between the thermostat and the heater terminals. Wire shall be No. 12 AWG stranded, nickel-plated copper with Teflon glass insulation and shall be the product of Chromalox, Catalog No. 6-CFI-12, Product Code No. 263783, or equal.

c. Each panel shall have a 1/2" stainless steel condensate drain, installed on a stainless-steel conduit hub, HGTZ Series, T&B or equal, in the bottom of the enclosure. Drain shall be 0-Z GedneyDBB-50SS, or equal.

2. Corrosion Control

a. Provide corrosion protection in each control panel with a corrosion-Inhibiting vapor capsule as manufactured by Northern instruments; Model Zerust VC, or Hoffman Engineering; Model A-HCI, or equal.

3. Enclosure Fans

a. Fans shall be furnished for soft start starters, VFDs and UPS panels, as required by the manufacturer, to provide air circulation and cooling. Fans shall be controlled by a temperature switch.

b. For VFD or soft-starter applications, the fan shall operate only when the drive/starter is "ON" and for a cool- down period after the drive/sarter has stopped Otherwise the fan shall not run when the drive/starter is "OFF". Louvers, if provided, shall have externally removable filters. The filter shall be metallic and washable.

c. Fan motors shall be protected by an input circuit breaker. Metal squirrel cage ball bearing, three phase fan motors with 10-year design life shall be used in the drive design. Plastic muffin fans are not acceptable. Fan power shall be obtained from a tap on the main control power transformer.

d. For UPS panel applications, a high temperature alarm shall be activated by an internal temperature switch. Alarm contacts shall be wired out to terminals for customer’s use.

e. Redundant fans shall be provided in the drive design as backup in the event of fan failure.

f. Enclosure fans shall not be allowed on any NEMA 4X Enclosures.

D. Internal Wiring

1. Power and control wiring shall be tinned stranded copper, minimum size No. 14 AWG, with 600 Volt, 90 degree C, flame retardant, Type MTW thermoplastic insulation. Line side power wiring shall be sized for the full rating or frame size of the connected device, and as shown on the Drawings.

2. Analog signal wires shall be 600 Volt Class, insulated stranded tinned copper, twisted shielded #16 AWG pair.

3. All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks. Field wiring shall not be terminated directly on any panel-mounted device.

4. All wiring shall be tagged and coded with an Identification number as shown on the Drawings. Coding shall be typed on a heat shrinkable tube applied to each end showing origination and destination of each wire. The marking shall be permanent, non-smearing, solvent-resistant type like Raychem TMS-SCE, or equal.

5. All wiring shall be enclosed in PVC wire trough with slotted side openings and removable cover. Plan wire routing such that no low twisted shielded pair cable conducting analog 4-20 mA signals or low voltage analog signals are routed in the same wire trough as conductors carrying discrete signals or power.

6. Single conductor wire shall be stranded, tinned 16 AWG and MTW insulation, as manufactured by American Insulated Wire or approved equal. Color-coding shall be purple for ungrounded conductors and white for grounded conductors.

7. Pair shielded cable for 4-20 mA DC loops shall be as specified in 26 05 19, “Low Voltage Electrical Conductors & Cables”.

8. Each conductor terminated under a screw head shall have a crimp on spade terminal applied to its end prior to its termination.

9. Each conductor has its own number and no number is used more than once.

10. The number of each wire is placed at both ends of the wire next to its end according to wire tagging instructions as specified in 26 05 19, “Low Voltage Electrical Conductors & Cables”.

11. Wiring shall be run enclosed in plastic wireway wherever possible. Wireways shall be installed as required to enclose panel wiring. Where the use of plastic wireway is not practical, conductors shall be bundled and run open. Conductors run open shall be bundled and bound at regular intervals not to exceed 6" with nylon ties or approved equal. Wires within a bundle are to be run parallel to one another and not twisted. Bundles shall have a uniform appearance, circular cross section, and shall be securely fastened to the panel framework. Conductors carrying different voltages that are from the same source may occupy the same wireway provided all are insulated for the maximum voltage of any conductor in the wireway. Wiring carrying voltages that originate at different source shall not run in the same wireway.

12. Wire ducts shall be insulated for the maximum voltage of any conductor in the wire duct. Wiring carrying voltages that originate at different source shall not run in the same wire duct. Wire ducts shall be color coded as follows:
    a. 24VDC shall be routed in a Wire duct with a Light Grey Color cover.
    b. 48VDC shall be routed in a Wire duct with a Blue Color cover.
    c. 120VAC shall be routed in a Wire duct with a White Color cover.

E. Field Installed Internal Wiring

1. Field installed interior wiring shall be neatly grouped by circuit and bound by plastic tie wraps. Circuit groups shall be supported so that circuit terminations are not stressed. In addition, low signal wiring (millivolt and milliamp) shall be bundle separately from the rest of the control wiring.
2. All field wiring shall be tagged and coded with an identification number. Coding shall be typed on a heat shrinkable tube applied to each end of the wire. The marking shall be a permanent, non-smearing, solvent-resistant type like Raychem TMS-SCE, or equal
3. In general, all conduit entering or leaving equipment shall be stubbed up into the bottom of the enclosure directly below the area in which the conductors are to be terminated, or from the top if shown on the Drawings. Conduits shall not enter the side unless approved in writing by the Owner/Engineer.

F. Terminal Blocks

1. All terminal blocks shall be 600V rated.
2. Terminal blocks shall be installed for wire terminations and shall be capable of mounting on a 35mm DIN-rail. Terminal blocks shall have a method of labeling for easy identification. Typewritten labels shall denote terminal block numbers and shall match numbers shown on shop drawings, O&M manuals and wiring diagrams. 25 percent additional terminals shall be provided for OWNER's use. Terminal blocks shall be available with screw clamp technology and be made of a non-corrosive material. The metal body shall contain a serrated pressure plate that will provide a gas-tight connection with the conductor. All terminal block wiring points shall be "touch safe" with no live voltages that can contact a misplaced finger. Terminal blocks shall be rated 600V and shall be Phoenix Contact UT Series, Allen Bradley 1492-H1 Series or approved equal.
3. Terminal blocks shall be DIN-rail-mounted one-piece molded plastic blocks with tubular-clamp-screw type and end barriers. Terminal blocks shall be rated for 600 volts except for control and instrumentation circuits, or 4-20 mA analog signal conductors.
4. Provide 600 volt rated terminal blocks for any conductor carrying any voltage over 120 volts to ground.
5. Provide 600 volt rated strap screw terminal blocks for any power conductors carrying over 20 amps, at any voltage. Terminals shall be double sided and supplied with removable covers to prevent accidental contact with live circuits.

6. Power conductors carrying over 20 amps, at any voltage shall be terminated to strap-screw type terminal blocks with crimp type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated. Do not terminate more than one conductor in any lug, and do not land more than two conductors under any strap-screw terminal point.
7. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed. Each terminal block shall have 20 percent spare terminals, but not less than two spare terminals.
8. Use the manufacturer's provided bridge connectors to interconnect terminal blocks terminating common or ground conductors.
9. Twisted shielded pair or triad cables shall have each individual conductor and shield drain wire landed on individual terminal blocks. Use the manufacturer's provided bridge connectors to interconnect terminal blocks terminating the shield drain wire conductors.
10. Control circuits, 120 volts and below, and 4-20 mA analog signal conductors shall be terminated with manufacturer's recommended insulated connectors.
11. Provide an AC ground bar bonded to the panel enclosure (if metal) with 20 percent spare terminals.
12. Provided ground terminal blocks for each twisted-shielded pair drain wire.

G. CONTROL RELAYS: Industrial type; contacts rated for 10 amps at 600 VACS; Allen-Bradley bulletin 700 type PK, Square D Class 8501 type X, or approved equal. Relays shall have the capability of having contact decks added in the field. Contacts shall be field convertible to normally open or normally closed. Coils and contacts shall each be replaceable without replacing any other part of the relay. Where control relays are in dicated on the Plans, industrial control relays shall be furnished whether the relay coil is operated with 120 VAC or 24 VDC. General purpose “plug-in” type relays shall not be acceptable.

H. TIMING RELAYS: Solid state. Ranges shall be as shown on the Plans. The timing relays shall have both normally open and normally closed contacts by having two sets of form C contacts. Timing relays where shown on the Plans shall be Square D, Class 9050 Type JCK60, time delay relay, Allen-Bradley 700-FS or approved equal model for operation on the control voltage of the equipment it is used in. Timing relay shall be provided with restraining strap.

I. INDICATING LIGHTS, SELECTOR SWITCHES, PUSHBUTTONS: Heavy duty and oil tight (30mm); Square d Class 9001 or approved equal. Pilot lights shall be push to test (LED type) and shall be Square D SK or approved equal.

2.04 MAIN CIRCUIT PROTECTIVE DEVICE

A. Unless otherwise shown on the Drawings, the main circuit protective device shall be a molded case (MCCB), 3 Pole, 600 Volt, fixed type, manually operated with stored energy closing mechanism. Trip device shall be solid state with adjustable long time pickup, and delay; adjustable short time pickup and delay; short time i2t switch.

B. Provide a flange mounted main power disconnect operating handle with mechanical interlock having a bypass that will allow the panel door to open only when the switch is in the OFF position. Where panels are shown or specified with inner and outer doors, disconnecting handles and controls shall be located on the inner door.

C. The overall short circuit withstand, and interrupting rating of the equipment and devices shall be 65,000 amperes RMS symmetrical at 480Y/277 Volts and 22,000AIC for 208Y/120 Volts.

D. For 120V panels a separate 120VAC Terminal Block and circuit breaker shall be provided for the panel.

2.05 REMOTE MONITORING AND CONTROL INTERFACE

A. General: All control and interconnection points from the equipment to the plant control and monitoring system shall be brought to a separate connection box. No field connections shall be made directly to the equipment control devices. Functions to be brought out shall be as shown on the Drawings

B. Discrete control or status functions shall be form C relays with contacts rated at 120 volts AC. Analog signals shall be isolated from each other.

C. Equipment functions to be directly interfaced to the Plant Control and Monitoring System shall be designed for operation with an Ethernet Connection.

D. The equipment manufacturer shall factory enter the proper IP Address for such connection. Upon request by the Contractor, the Owner/Engineer will provide the proper Internet Protocol Address (IP Address), to be configured by the equipment manufacturer.

E. Refer to the Drawings for monitored parameters.

2.06 POWER SUPPLY

A. The power supply shall be fully enclosed and provide screw terminations by means of a cable clamping terminal block activated by a screw. Connections shall be gas-tight, and the terminal block shall be fabricated of non-ferrous, non-corrosive materials. All wiring points shall be touch safe with no live voltages that can contact a misplaced finger. Power supply shall have integral metal mounting feet to attach to 35-mm DIN-rail.

B. The power supply shall conform to UL 508C standards allow use at the full rated current. The power supply shall have a visual indicator for applied power. Operating temperature range shall be -25°C to 70°C. Power supply shall have means of limiting DC current in case of short circuit and shall automatically reset when fault is corrected. Power supply shall be able to be run in parallel mode without external circuitry to provide redundancy. Residual ripple shall not exceed 150 mV peak to peak.

C. Provide regulated power units:

1. Designed to provide power to:

   a. Two-wire or four-wire field instruments

   b. Other devices as indicated on Drawings or Specifications

   c. Power supplies shall be summable type.

2. Each power supply shall be sized such that it will carry no more than 75 percent of capacity under normal loads. Calculated full load shall not exceed the 100% power rating of the power supply. Temporary power supply overload conditions of the power supply shall be approved by the Engineer prior to manufacturing of the panel.

D. Separate AC circuit breakers shall be provided for each power supply.

E. Provide integral battery backup to maintain 60 seconds upon loss of all AC power. This is required to ensure transient power surges and dips do not affect the operation of the PLC system.

F. Capable of meeting or exceeding electrical noise tests, NEMA ICS1-109.60-109.66.

G. Capable of meeting or exceeding surge-withstand capability tests per ANSI/IEEE C37.90.1.

H. Power Distribution:

1. Immune to transients and surges resultant from noisy environment.

2. Shall provide constant voltage level DC distribution to all devices.

I. Power supply shall be Phoenix Contact, Power-One or approved equal. No open frame power supplies

2.07 FACTORY TESTING

A. The entire control panel shall be completely assembled, wired, and adjusted at the factory and shall be given the manufacturer's routine shop tests and any other additional operational test to insure the workability and reliable operation of the equipment.

B. Factory test equipment and test methods shall conform with the latest applicable requirements of ANSI, IEEE, UL, and NEMA standards.

C. The operational test shall include the proper connection of supply and control voltage and, as far as practical, a mockup of simulated control signals and control devices shall be fed into the boards to check for proper operation.

D. Factory test equipment and test methods shall conform to the latest applicable requirements of ANSI, IEEE, UL, and NEMA standards, and shall be subject to the Owner/Engineer's approval.

3.00 EXECUTION

3.01 INSTALLER'S QUALIFICATIONS

A. Installer shall be specialized in installing this type of equipment with minimum 5 years documented experience. Experience documentation shall be submitted for approval prior to beginning work on this project.

3.02 EXAMINATION

A. Examine installation area to assure there is enough clearance to install the equipment.

B. Housekeeping pads shall be included for the floor mounted motor controllers as detailed on the Drawings except for motor controllers which are to be installed adjacent to an existing unit. Housekeeping pads for these (if used) should match the existing installation.

C. Check concrete pads and baseplates for uniformity and level surface.

D. Verify that the equipment is ready to install.

E. Verify field measurements are as instructed by manufacturer.

3.03 INSTALLATION

A. The Contractor shall install all equipment per the manufacturer's recommendations and Contract Drawings.

B. Conduit hubs for use on raceway system pull and junction boxes shall be watertight, threaded aluminum, insulated throat, stainless steel grounding screw, as manufactured by T&B H150GRA Series, or equal.

C. Conduits entering a control Panel or box containing electrical equipment shall not enter the enclosure through the top.

D. Install required safety labels.

3.04 RACEWAY SEALING

A. Where raceways enter junction boxes or control panels containing electrical or instrumentation equipment, all entrances shall be sealed with 3M 1OOONS Watertight Sealant, or approved equal

B. This requirement shall be strictly adhered to for all raceways in the conduit system.

3.05 FIELD QUALITY CONTROL

A. Inspect installed equipment for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible electrical connections. Minimum acceptable values are specified in manufacturer's instructions.

3.06 FIELD ADJUSTING

A. Adjust all circuit breakers, switches, access doors, operating handles for free mechanical and electrical operation as described in manufacturer's instructions.

3.07 FIELD TESTING

A. Perform all electrical field tests recommended by the manufacturer. Disconnect all connections to solid-state equipment prior to testing.

B. Megger and record phase to phase and phase to ground insulation resistance. Megger, for 1 minute, at minimum voltage of 1000 VDC. Measured Insulation resistance shall be at least 100 megohms. In no case shall the manufacturer's maximum test voltages be exceeded.

C. Test each key interlock system for proper functioning.

D. Test all control logic before energizing the motor or equipment.

3.08 CLEANING

A. Remove all rubbish and debris from inside and around the motor controllers. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air.

3.09 EQUIPMENT PROTECTION AND RESTORATION

A. Touch-up and restore damaged surfaces to factory finish, as approved by the manufacturer. If the damaged surface cannot be returned to factory specification, the surface shall be replaced.

3.10 MANUFACTURER'S CERTIFICATION

A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, including all settings designated in the Power System Study, and tested in accordance with the manufacturer's recommendations.

B. The Contractor shall provide three (3) copies of the manufacturer's representative's certification.

3.11 TRAINING

A. Provide manufacturer's services for training of personnel in operation and maintenance of all the control panels furnished under this Section.

B. The training for each type of equipment shall be for a period of not less than one (1) four hour class. Prior to the warranty expiring, the panel manufacturer shall provide an additional 2 hour training class on the operation and maintenance of all control panels furnished under this section.

C. The cost of training program to be conducted with Owner's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

D. Provide detailed O&M manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.

F. The Owner reserves the right to videotape the training sessions for the Owner's use.

END OF SECTION

26 50 00 LIGHTING

1.00 GENERAL

1.01 WORK INCLUDED

Furnish labor, materials, equipment and incidentals necessary to install light fixtures, complete with lamps, ballasts and other incidentals. Electrical work shall be in accordance with Section 26 05 00, “Common Work Results for Electrical”.

1.02 QUALITY ASSURANCE

A. ACCEPTABLE MANUFACTURERS

1. Refer to Lighting Fixture Schedule on contract drawings.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include Shop Drawings:

1. Refer to the Lighting Fixture Schedule for the manufacturer and model number for each type of fixture. Submittals with alternate manufacturers than those listed in the lighting fixture schedule will not be reviewed and will be returned without review.
2. Bill of Material
3. Product data sheets for each fixture type:
    a. Product data sheets shall be marked for each fixture type, arranged in the order of the fixture designation.
    b. Product data for fixtures, lamps, drivers and emergency lighting units.
    c. Outline drawings indicating dimensions and principal features of the fixture.
    d. Electrical ratings and photometric data provided by certified laboratory tests for the fixture and lamps.
    e. Provide data on LED Fixture indicating it is rated for maintained 70% lumen output at 60,000 hours.

1.04 DELIVERY AND STORAGE

A. Ship light fixtures inside protective cartons and keep packaged until installed. Deliver lamps to the job site in the original packing cases and sleeves.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.05 JOB CONDITIONS

A. LED fixtures shall be suitable to operate in temperatures below 32 degrees F.

B. Provide special mounting, enclosures and fire-safing, as required by the authorities having jurisdiction so that the integrity of the U.L. listed ceiling assembles is maintained.

C. Provide U.L. labels where fixtures are subject to moisture. Provide DL or WL label on fixtures required for the location.

D. Contractor shall verify voltages with power supplies prior to ordering fixtures.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.

2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.

3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

4. Warranty Period for Lamps: Replace lamps and fuses that fail within 12 months from date of Substantial Completion; furnish replacement lamps and fuses that fail within the second 12 months from date of Substantial Completion.

5. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than 5 years from date of Substantial Completion.

2.00 PRODUCTS

2.01 MATERIALS

A. LED DRIVERS AND LAMPS: Drivers and LED lamps shall be integral to the fixture. The fixture shall be rated for operating temperatures of -40°C to +60°C, UL wet location rated with frosted impact rated glass lens. Fixture shall be rated for maintained 70% lumen output at 60,000 hours.

B. POLES AND SUPPORT COMPONENTS:

1. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts, unless otherwise indicated.

2. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

    a. Materials: Shall not cause galvanic action at contact points.

    b. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication, unless stainless-steel items are indicated.

    c. Anchor-Bolt Template: Plywood or steel.

3.00 EXECUTION

3.01 INSTALLATION

A. Provide the lighting fixtures, as specified and scheduled on the plans. If a type designation is omitted, verify the fixture selection with the Engineer before installation.

B. Check the architectural finishes and provide fixtures with proper trim, frames, support hangers and other hardware required to coordinate with the proper finishes, regardless of the specified or scheduled catalog number, prefixes and suffixes.

C. Test and aim flood lights, when dark outside to provide a uniform and widespread, illuminated area. Direct units as indicated or instructed by the Engineer to prevent objectionable glare.

D. Furnish and install a complete exterior lighting control system, as indicated on the plans. Provide materials and equipment to properly interface timing devices and photocells with relays and contactors so that a complete and satisfactory operating system is rendered.

3.02 CLEAN AND ADJUST

Immediately before final inspection, clean all fixtures, inside and out, including plastics and glassware. Adjust all trim to properly fit adjacent surfaces. Replace broken or damaged parts. Lamp and test all fixtures for electrical, as well as, mechanical operation.

3.03 SPARE PARTS

A. Globes and Guards: Furnish at least one of each type.

END OF SECTION

DIVISION 40

PROCESS INTEGRATION

40 90 01 INSTRUMENTATION

GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment, and incidentals necessary to install all equipment for complete instrumentation and controls. CONTRACTOR's work shall include but not be limited to the following:

1. Installation of equipment furnished under this contract.
2. Interconnections between equipment furnished under this contract.
3. Interconnection between equipment furnished under this contract and the existing instrumentation and control equipment or that furnished and installed under other contracts.

B. The CONTRACTOR's attention is directed to the fact that instrumentation is an integrated system and as such shall be furnished by one vendor or system integrator who shall provide all the equipment and appurtenances, regardless of manufacture, and be responsible to the CONTRACTOR for satisfactory operation of the entire system.

C. Supervision, labor, tools, and materials necessary for installation of the instrumentation equipment and material furnished herein and their interconnection shall be provided by the CONTRACTOR. Installation work shall conform to applicable city, state, and national building and electrical codes.

D. Coordinate the work of the system manufacturer's service personnel during construction, testing, calibration, and acceptance of the instruments.

E. Provide equipment as shown in the specifications and on the drawings.

1.02 QUALITY ASSURANCE

A. GENERAL: Equipment shall be the Manufacturer's latest and proven design. Specifications and drawings call attention to certain features, but do not purport to cover all details entering the design of the instrumentation system. The completed system shall be compatible with the functions required and the equipment furnished by the CONTRACTOR.

B. OPERATING VOLTAGE: Electrical components of the system shall operate on 120 volt, single-phase, 60 Hertz, except as otherwise noted in the specifications.

C. POWER SUPPLIES: The drawings and specifications indicate the energy sources that will be provided. Any other devices or power supplies necessary to obtain proper operation of the instrument system from these energy sources shall be furnished with the instrumentation.

D. PROTECTION

1. The instrumentation system supplier shall be responsible for input-output isolation of all incoming and outgoing signals.

2. Each 4-20 mA DC process measurement current loop installed on this contract shall be protected by insertion of a 1/16-amp fuse, Buss Type MKB. Fuses shall be installed in standard fuse blocks.
3. The necessary fuses or switches required by the Instrumentation Manufacturer for his equipment shall be provided with the equipment. The instruments requiring an internal power supply shall have an internal ON-OFF switch.

E. INPUT/OUTPUT

1. In general, and unless specifically stated otherwise, inputs and outputs involving instrumentation systems shown shall be 4-20 mA DC process measurement signals. Current loop isolators, current repeaters, or other signal isolators shall be furnished and installed as required to meet instrument specifications and to make instrumentation system fully operational.
2. Pair shielded cable, as specified in Section 26 05 19 LOW VOLTAGE ELECTRICAL POWER AND CONDUCTORS AND CABLES shall be used for all 4-20 mA DC loops.

F. HARDWARE CHECKOUT

1. CONTRACTOR shall be responsible for checkout and calibration of all field instrumentation up to and including the PLC cabinets. CONTRACTOR shall provide a checkout of all I/O points under the supervision of the OWNER'S REPRESENTATIVE. Checkout shall be scheduled two weeks in advance of the date with the OWNER'S REPRESENTATIVE. CONTRACTOR shall provide a schedule of checkout and procedures to be used to the OWNER'S REPRESENTATIVE two weeks in advance of the test date for the OWNER'S REPRESENTATIVE's approval.
2. I/O points and sequence of operations shall be judged Pass/Fail by the OWNER'S REPRESENTATIVE. If a point fails, the CONTRACTOR shall move on to the next point and resubmit a new test schedule to the OWNER'S REPRESENTATIVE. The CONTRACTOR shall run a rehearsal of the test procedure to be witnessed by the OWNER'S REPRESENTATIVE prior to the test date as field modifications of equipment during the testing for a failed point shall not be allowed. Testing shall simulate actual field conditions and reflect the sequence of operations expected when in use.

G. EQUIPMENT WARRANTY

1. All equipment shall be warrantied for a period of two (2) years after final acceptance.

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Document Management” and shall include:

1. Shop Drawings:

a. Shop drawings shall be submitted to the ENGINEER for approval before fabrication or shipment to the job. Equipment shall not be fabricated or shipped to the job before receipt of approved shop drawings from the ENGINEER. Submittals for approval shall include (1) component manufacturing data sheet indicating pertinent data and identifying each component by item number and nomenclature, (2) component drawing showing dimensions, mounting, and external connection details, (3) a system piping schematic and wiring schematic each on a single drawing with full description of operation, (4) complete schematic diagram of each piece of electrical and electronic equipment including electrical valves and tolerances for each component. Component identification on the schematic shall be as described above.

b. Following approval, the manufacturer shall be responsible for preparation of the required sets of these drawings for distribution as indicated in Division 0 and Division 1 specifications.

c. Shop drawings submitted for all equipment furnished under this section of the specifications, shall be submitted at the same time in the same package. Partial submittals will not be reviewed.

B. Field verification letter stating the Contractor, the electrode manufacturer and the submersible level transmitter manufacturer have met at the Spillway and verified the proposed level electrodes and submersible level transmitter will physically fit in the existing wells and the proposed application will work. Letter shall be submitted prior to formal submittal being provided to the Engineer for review.

C. Sales bulletins and other general publications are not acceptable as submittals for approval.

D. Equipment installation Report. CONTRACTOR shall provide an Equipment Installation Report for each instrument (flow meter, level transmitter, etc.) to the ENGINEER/OWNER for approval. The equipment installation report shall include documentation stating that the instrument was installed and properly calibrated per the manufacturer's recommendations by an Authorized representative of the instrument manufacturer. All parameters required for programming of the instrument shall be provided in a hard copy format as part of the equipment installation report. Documentation stating that the person performing the calibration and start-up is an authorized representative shall be provided as well.

D. Operation and Maintenance Manuals

1. Operating instructions shall incorporate a functional description of the entire system including the system schematics which reflect "as-built" modifications. Wiring diagrams shall be furnished as a part of the Operation and Maintenance Manuals which clearly show terminal numbers and wire numbers as they are in the instrumentation system. Instrument panel wiring shall be such that each wire installed has its own number designation at each end and such that no number is repeated. Instrument panel wire tagging instructions as specified in Section 26 05 19 LOW VOLTAGE ELECTRICAL POWER AND CONDUCTORS & CABLES shall be followed.
2. Special maintenance requirements particular to the system shall be clearly defined along with special calibration and test procedures.

3. CONTRACTOR shall provide point to point interconnection diagrams for all control/instrumentation connections between the control panels and field devices including instruments, motor starters, and switchgear. Point-to-point diagrams shall be provided for all control/instrumentation wiring between field devices and panels, i.e., motor starters, switchgear, etc. CONTRACTOR shall provide AutoCAD files of interconnection diagrams to the OWNER. Interconnection diagrams shall include cable no., terminal block no., instrument no., panel no., etc. Hard copies of the Interconnection drawings shall be submitted to the ENGINEER for approval as an official submittal prior to the final AutoCAD files being submitted.

1.04 STANDARDS

A. The applicable provisions of the following standards shall apply as if written here in their entirety:

ASTM A-126 Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings

ASTM B-61 Specification for Steam and Valve Bronze Castings

1.05 JOB CONDITIONS

A. SPECIAL TOOLS: Furnish a kit which contains special size wrenches and other types of tools, not normally available, which are necessary for assembling, disassembling, aligning, and calibrating each piece of equipment. In addition, any piece of equipment (meter, test set, etc.) required by the Manufacturer to align, adjust, or otherwise calibrate any item under this section of the specification shall be furnished, including software.

PRODUCTS

1.06 REMOTE EQUIPMENT

A. Controls for remote electrically operated or motor driven equipment shall be complete, including the necessary auxiliary relays to require only wiring and connections to the equipment control circuit. Contacts for control of remote motor operated or electrically operated equipment shall be rated not less than 10 amperes at 120 volts unless otherwise specified herein.

B. Remote motor operated or electrically operated equipment shall have a separate 120-volt control circuit which operates through the dry contacts provided by the instrumentation system.

1.07 ENCLOSURES/PANELS

A. Enclosures and panels as indicated on the plans and in this specification shall be furnished, installed, and wired. Enclosures for equipment in the control room shall be NEMA 12, 14-gauge steel, NEMA 12 for interior areas with ventilation and NEMA 4X, 316 Stainless Steel for outdoor and spillway gallery locations. NEMA 4X, 316 stainless steels for chemical building. All enclosures shall have a quick release luggage type stainless steel clasp.

1.08 LEVEL ELECTRODES

A. Switch shall be of the conductance type with PVC sheath and .25-inch stainless steel rod electrodes for lengths up through 6 feet. For lengths greater than 6 feet, wire suspension type with stainless steel shield electrodes shall be provided. Electrode fitting enclosure shall be an epoxy coated and gasketed aluminum housing of suitable configuration for the application. Induction relays shall be two winding types. Primary power supply shall be 120 volts, 60Hz. Secondary potential shall not exceed 220 AC and short circuit current shall not exceed 25 milliamperes.

B. Level relay shall be provided with 1 normally open and 1 normally closed set of contacts. Level relay shall be B/W Controls 1500 series or approved equal.

The level electrodes shall be installed per the manufacturer's recommendations using a 6" cast iron electrode holder. Prior to ordering Contractor shall field verify size of flange/electrode holder required. The level electrode holder shall be B/W Controls Catalog Number 6013-E554-5E. The electrodes shall be adjustable height wire suspended electrodes. The electrodes shall be B/W Controls Type 6013. The electrodes shall be equipped with enough submersible cable. Provide mounting accessories as required for mounting the level electrodes to the top of the relief well. Field verifies exact requirements prior to submitting formal shop drawing to Engineer for review and comment.

Electrodes shall be provided for the following:

Relief Well No.4		
Tag	**Service**	Set Point
EL. 68.0	High Level Alarm	EL. 68.0
EL. 67.0	Start Pump	EL. 67.0
EL. 57.5	Level Indication	EL. 57.5
EL. 55.0	Stop Pump	EL. 55.0
EL. 54.0	Low Level Alarm	EL. 54.0

Relief Well No.10		
Tag	**Service**	Set Point
EL. 68.0	High Level Alarm	EL. 68.0
EL. 67.0	Start Pump	EL. 67.0
EL. 65.0	Level Indication	EL. 65.0
EL. 60.0	Stop Pump	EL. 60.0
EL. 59.0	Low Level Alarm	EL. 59.0

C. Induction control relays shall be housed in the Relief Wells No.4 and No.10 Level Control Panel.

D. Coordinate elevations with the Owner and field verify prior to formally submitting shop drawings.

E. Contractor shall provide pipe extension, like that of existing that is to be demolished, as required for installation of electrodes.

F. Prior to providing formal submittal on electrodes and control panel, Contactor along with electrode manufacturer and submersible transmitter shall field verify that electrodes and submersible transmitter will physically fit in the existing well and the mix of electrodes and transmitter installed in the well will work. If the proposed installation will not work, this shall be brought to the Engineer's attention. Contractor shall provide in writing as a formal submittal that this field verification and coordination has taken place.

1.09 SUBMERSIBLE LEVEL TRANSMITTER

A. Unit shall be a hydrostatic pressure sensor for level measurement of lake water. Hydrostatic pressure sensor types of continuous level measuring system consisting of level element, transmitter, and cable from level element to transmitter. The hydrostatic pressure sensor shall be equipped with permanent hermetically sealed cable probe. The hydrostatic pressure sensor shall be Endress & Hauser FMX21 or Siemens Sistrans submersible level transmitter or approved equal.

B. The submersible hydrostatic pressure sensor shall be connected to a remotely mounted monitoring device, Endress & Hauser Model RIA 261. Device to be mounted in Relief Wells No.4 and No.10 Level Control Panel.

C. Level system shall have an overall accuracy of ± 0.1% of full scale and shall operate on 4-20mA loop power derived from the Level Control Panel.

D. Transmitter shall contain solid state controls to operate transducer and to provide a 4 to 20 mA DC output signal in linear proportion to the level being sensed. Transmitter shall be 316 stainless steel construction.

E. Interconnecting cable between hydrostatic pressure sensor and the display shall be furnished with the unit with length as required. Cable shall be of one continuous length, no splicing allowed. Field verifies length of cable to provide.

Tag	Service	Range
RW4-LT	Relief Well No.4	0-70'
RW10-LT	Relief Well No.10	0-70'

Prior to providing formal submittal on submersible transmitter, Contactor along with submersible level transmitter manufacturer and electrodes manufacturer shall field verify that electrodes and submersible transmitter will physically fit in the existing well and the mix of electrodes and transmitter installed in the well will work. If the proposed installation will not work, this shall be brought to the Engineer's attention. Contractor shall provide in writing as a formal submittal that this field verification and coordination has taken place.

EXECUTION

1.10 INSTALLATION

A. Wire each device requiring power so that when wires are removed from any one device, power is not disrupted to any other device. Ground the case of each device either by mounting directly on a steel frame or by a third wire.

1.11 FIELD QUALITY CONTROL

A. The supervisory service of a factory-trained service engineer who is specifically trained on the type of equipment herein specified shall be provided during construction to assist the CONTRACTOR in the location of sleeves; methods of installing conduit and special cable; mounting, piping, and wiring one of each type of device, and the methods of protecting all the equipment prior to placing it into service. Upon completion of the installation, the services of the above service engineer shall be provided for calibration and start up of the equipment and for instructing the operating personnel. The Manufacturer shall provide sufficient service to place the system in satisfactory operation.

B. Check out and calibrate the system upon completion of the installation.

C. Prior to the OWNER turning on any form of energy to the system, the CONTRACTOR shall provide the ENGINEER with a certified statement of approval of the installation including his supplier's authorization for turning on energy to the system.

END OF SECTION

APPENDIX A

PRE-PURCHASED EQUIPMENT DOCUMENTS

SPECIFICATIONS

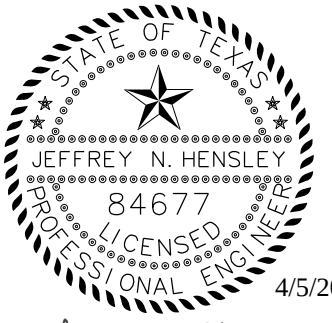
SUBMITTTAL DATA

PRE-PURCHASED DOCUMENTS
FOR

Generator, Automatic Transfer Switch & External Fuel Tank

Prepared for
Sabine River Authority of Texas
Sabine River Authority of the State of Louisiana

April 2022



FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

PREPARED BY:
FREESE AND NICHOLS, INC.
LA REGISTERED ENGINEERING FIRM E.F- 0000341
TEXAS REGISTERED ENGINEERING FIRM F-2144
801 CHERRY STREET SUITE 2800
FORT WORTH, TEXAS 76102

FNI Project No: SRA19480

26 32 13 ENGINE GENERATORS

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, apply to this Section.

B. The engine manufacturer's authorized distributor shall supply the complete power system to include the generator, muffler, flex connector, external fuel tank, fuel pump, and related components specified in this section, so that there is one source of responsibility for coordination and testing. Installing Contractor shall provide balance of exhaust system and fuel lines between tank and genset.

C. Specification 26 36 00, Transfer Switches. Generator supplier shall be responsible for providing automatic transfer switch as part of the generator package,

1.02 APPLICABLE EQUIPMENT SPECIFICATIONS

A. The Generator manufacturer shall be responsible for supplying the following equipment that is either included within this specification or within other specifications sections included within these contract documents.

1. Equipment that shall be provided by the Generator manufacturer that is specified in this section of the documents includes packaged diesel-engine generator sets with the following features and accessories:

a. Battery charger.

b. External fuel tank with fuel pump

c. Engine generator set.

d. Muffler.

e. Open indoor enclosure.

f. Remote stop switch

g. Starting battery

h. Generator Set Controller and Panel

i. Generator Terminal Box

1.03 DEFINITIONS

A. Standby Rating: Power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of a power outage.

B. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

C. Steady-State Voltage Modulation: The uniform cyclical variation of voltage within the operational bandwidth, expressed in Hertz or cycles per second.

1.04 SUBMITTALS

Submittals shall include:

A. Product Data: Include data on features, components, ratings, and performance. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Dimensioned outline plan and elevation drawings of engine generator set and other components specified.

2. Thermal damage curve for generator, include X and R information, transient and sub-transient reactance, etc.

3. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Indicate fabrication details, dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

2. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.

3. Wiring Diagrams: Detail wiring for power and control connections and differentiate between factory-installed and field-installed wiring.

4. Generator sizing analysis.

a. Detailed sizing analysis shall clearly identify assumptions made for loads being started/operated by the generator.

1). The maximum voltage drop allowed shall be 15%.

2). The generator will be connected to a new 480V Panelboard in the spillway control house. The generator shall be started and stopped from a new 480V automatic transfer switch.

a). Spillway: The generator shall be sized to start and run one 3 HP gate operator and all other connected ancillary loads/equipment at the Spillway. Manufacturer shall certify that the generator will not stall under these conditions. As a minimum the generator shall be sized to per the following:

- Energize all bridge lights, canopy lights at all gates and lights shining on the apron (floodlights). Total of 30 – 60 Watt compact fluorescent bridge lights, 48-30 Watt LED canopy lights, 12 – 400 Watt LED floodlights, and 10 – 20 Watt LED navigation lights.
- Then energize 2 relief well pumps.
- Then energize 4 gates by turning 3 on at once then adding the 4th just a few seconds later

b). The sizing analysis for one of the scenarios shall show the maximum number of gates with miscellaneous loads operating that can be operated off of the 60kW generator

3). Ambient temperature shall be a minimum of 105 degrees Fahrenheit and generator shall be rated to operate in a 122 degrees F ambient temperature.

4). Calculations shall be for a Diesel Fuel generator set.

b. The generator supplier shall be responsible for obtaining all information to run the generator sizing analysis, including nameplate rating listed on the motors. The manufacturer shall be responsible for obtaining actual load data.

c. The kW rating of the generator shall be 60kW.

5. Provide a detailed layout of the generator and all associated piping/muffler system and fuel tank fuel lines, fuel maintenance system and fuel pumping system.

6. Generator supplier shall verify during the bid phase the proposed unit can physically fit into the existing space in the Spillway Control Room. This shall also be confirmed at the time of the formal submittal to the Engineer for review and approval.

7. Provide cut sheets for all equipment being provided for the generator including:

a. Generator

b. External fuel tank

c. Fuel maintenance system

d. Fuel pumps

e. Exhaust Fans and louvers

f. Batteries and charging system

g. Time current curves for generator circuit breaker

h. Muffler and exhaust system

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

D. Factory Test Data: Submit factory test data to Engineer for approval prior to shipping generator to job site.

E. Field Test and Observation Reports: Indicate and interpret test results and inspection records relative to compliance with performance requirements. Provide load bank and 3rd Party Sound testing results. All Generator Testing Report(s) shall be submitted to Owner/Engineer for approval no later than two weeks after testing has been conducted.

F. Equipment installation report.

G. Certified summary of prototype-unit test report.

H. Operations & Maintenance manual.

I. Warranty information.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of emergency maintenance and repairs at the Project with twelve hours' maximum response time.

B. Source Limitations: Obtain packaged engine generator and auxiliary components specified in this Section through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Comply with NFPA 70, 99 101 and 110, latest edition.

E. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

F. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

G. Submit written reports for all required factory and field tests.

H. Comply with NEMA MG-1 and SG-1.

I. Comply with UL 1008.

1.06 FACTORY INSPECTION AND TESTS

A. TESTS

1. GENERAL

2. Factory tests shall include a test and demonstration of all equipment functions, per manufacturer's standard testing procedures. The purpose of the test shall be to verify the functionality, performance and stability of each generator. The test shall include, but not be limited to, a complete operational test demonstrating all controls, inputs, outputs, etc., shown per the plans and specifications. The manufacturer shall submit two weeks in advance of the day that test will be made a detailed testing plan. This plan shall be subject to the Engineer's approval.

3. The generator manufacturer shall provide the actual test data, observations and certification that the tests have been completed prior to shipment to the Engineer for approval

B. Factory Testing.

1. The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. All testing shall be conducted at the factory. No exceptions. A certified test report shall be provided. All testing shall be performed with calibrated metering.

2. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include:

a. Reactive Load Bank Testing, 20 minutes at 25% load, 20 minutes at 50% load, 20 minutes at 75% load, 4 hours at 100% load.

b. Transient testing, 0-25-0%, 0-50-0%, 0-75-0%, 0-100-0%.

c. Standard factory test procedures" maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.

d. Provide a certified copy of the testing report to the engineer after shipment.

1.07 DELIVERY AND HANDLING

A. Deliver engine generator set, system components, UL 142 fuel tank and ATS to the Owner's Shop in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations.

B. Generator supplier shall deliver and offload equipment at the Owner's Shop. Address:

518 PR 6056
Burkeville, TX 75932

1.08 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace packaged engine generator and auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of delivery.

C. Manufacturer shall send a representative out to the job site one year after final completion to re-test the generator at no extra cost to the owner.

1.09 EXTRA MATERIALS

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

1. Fuses: One for every ten of each type and rating, but not less than one of each.

2. Indicator Lamps: Two for every six of each type used, but not less than two of each.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:

1. Caterpillar, Inc.; Engine Div

2. Onan Corp/Cummins

3. Kohler

4. Generac

5. No other manufacturers are acceptable

2.02 ENGINE GENERATOR SET

A. Furnish a coordinated assembly of compatible components.

B. Output Connections: 480V Three phase, four wire.

C. Safety Standard: Comply with ASME B15.1.

D. Nameplates: Each major system component is equipped with a conspicuous nameplate of component manufacturer. Nameplate identifies manufacturer of origin and address, and model and serial number of item.

E. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.

F. Skid: Adequate strength and rigidity to maintain alignment of mounted components without depending on a concrete foundation. Skid is free from sharp edges and corners. Lifting attachments are arranged to facilitate lifting with slings without damaging any components.

2.03 GENERATOR-SET PERFORMANCE

A. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.

B. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage recovers to remain within the steady-state operating band within three seconds.

C. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.

D. Steady-State Frequency Stability: When system is operating at any constant load within rated load, there are no random speed variations outside the steady-state operational band and no hunting or surging of speed.

E. Transient Frequency Performance: Less than 5 percent variation for a 50 percent step-load increase or decrease. Frequency recovers to remain within the steady-state operating band within five seconds

F. Output Waveform: At no load, harmonic content measured line to line or line to neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.

G. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, the system will supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to any generator system component.

H. Start Time: Comply with NFPA 110, Type 10, system requirements.

I. Generator set size shall be as follows:

1. Rating: 60kW/75kVA

2. Generator manufacturer shall provide a detailed sizing analysis to the Engineer for approval. Detailed sizing analysis shall clearly identify assumptions made for loads being

started/operated by the generator. When conducting the generator sizing analysis the voltage drop of the generator shall be set at a maximum of 15%. The generator manufacturer and Contractor shall be responsible for obtaining all information to run the generator sizing analysis. Any changes to the generator size shall be brought to the Engineer's attention. Sizing analysis shall be submitted to the Engineer with the generator's initial submittal.

2.04 SERVICE CONDITIONS

A. Environmental Conditions: Engine generator system withstands the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 15 to 122 deg F.

2. Altitude: 3256 feet.

2.05 ENGINE

A. Comply with NFPA 37.

B. Fuel: Fuel oil, Grade DF-2. Generator shall be suitable for operation using ultra-low sulfur diesel. Generator supplier shall provide fuel additives as required to fill the 72 hour external fuel tank a minimum of two times.

C. Rated Engine Speed: 1800 rpm.

D. Lubrication System: Pressurized by a positive-displacement pump driven from engine crankshaft. The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.

2. Thermostatic Control Valve: Controls flow in system to maintain optimum oil temperature. Unit is capable of full flow and is designed to be fail-safe.

3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps or siphons or special tools or appliances.

E. Engine Fuel System: Comply with NFPA 37. System includes the following:

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.

2. Relief/Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

3. Fuel cooler, radiator mounted, sized as recommended by the engine manufacturer to cool fuel prior to return to the engine fuel tank.

4. Primary filter/water separator.

5. External fuel pump if required, based on remote 72 hour fuel tank being mounted at the same elevation as the diesel generator and approximately 15 feet away. Fuel line to be routed overhead from external 72 hour tank to diesel generator. Generator drawings shall include proposed fuel line size. External fuel pump shall operate off of 120VAC.

2.06 GOVERNOR

1. The engine governor shall be a electronic Engine Control Module (ECM) with 24-volt DC Electric Actuator. The ECM shall be enclosed in an environmentally sealed, die-cast aluminum housing which isolates and protects electronic components from moisture and dirt contamination. Speed droop shall be adjustable from 0 (isochronous) to 10%, from no load to full rated load. Steady state frequency regulation shall be +/- 0.25%. Speed shall be sensed by a magnetic pickup off the engine flywheel ring gear. A provision for remote speed adjustment shall be included. The ECM shall adjust fuel delivery according to exhaust smoke, altitude and cold mode limits. In the event of a DC power loss, the forward acting actuator will move to the minimum fuel position.

2.07 ENGINE COOLING SYSTEM

A. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment. Jacket heater shall operate on either 120 or 208VAC.

B. Description: Closed loop, liquid cooled, with radiator factory mounted on engine generator-set skid and integral engine-driven coolant pump.

C. Radiator: Rated for specified coolant.

D. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent distilled water, with anticorrosion additives as recommended by engine manufacturer.

E. Expansion Tank: Constructed of welded steel plate and equipped with gage glass and petcock.

F. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

G. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

   1. Rating: 50-psig (345-kPa) maximum working pressure with 180 deg F (82 deg C) coolant, and non-collapsible under vacuum.

   2. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

   3. The generator shall be rated for continuous standby duty with a temperature rise of 125 deg C.

2.08 FUEL STORAGE TANK

A. Generator manufacturer shall provide bids to the Owner for the following type of tank:

1. The external fuel tank shall be listed and labeled as UL142 and be suitable for installation outdoors. The tank capacity shall be rated for 72 hour continuous operation of the generator at full load. Tank dimensions shall be approximately 96”Lx48”Wx40”H.

B. The tank shall be fabricated from minimum 3/16” steel. The tank shall be designed, tested and labeled per UL requirements. The tank shall be tested at 3-5 PSI air pressure as outlined in UL 142.

C. The tank shall incorporate internal stiffeners to create a smooth tank top surface and limit the accumulation of water on top of the tank. No external support beams shall be permitted on top of the tank to maintain a clear open area.

D. The outer tank shall be abrasive blasted per SSPC-SP10 (White metal blast), then painted with one coat of a high build polyester glass flake to a minimum of 12-15 mils (DFT) thickness, and a finish coat of aliphatic polyurethane with a minimum of 3 mils (DFT). The manufacturer shall provide a 20 year external corrosion warranty.

E. The tank shall be clearly labeled indicating the type of product, the volume capacity, the top loading capacity, and the manufacturer.

F. Updraft and emergency venting systems shall be provided by tank manufacturer per UL 142 requirements.

G. The tank is intended for stationary installation and in accordance with NFPA 30 and NFPA 37. Comply with all federal, state and local codes.

H. If required, the tank shall be provided with fuel pump. Fuel pump shall operate on 120 VAC. Fuel pump shall have the capacity to pump from the external 72 hour tank to the generator that is located approximately 15 feet away at the same elevation. Generator manufacturer shall field verify all requirements for the design of the fuel pumping system.

I. The following accessories shall be installed in the tank:

1. Leak sensor switch installed in interstitial space and wired to generator control panel. Generator panel shall provide dry set of contacts that closes upon level switch activation to be used by customer.

2. Low level alarm switch wired to generator control panel.

3. Mechanical fill limiter, Morrison 9095A or equal, with tight fill adapter, installed inside spill containment fill area.

4. Mechanical level gauge.

5. Engine supply pick-up tube and return connections with suction drop tube.

2.09 ENGINE EXHAUST SYSTEM

A. Muffler: Sized as recommended by engine manufacturer.

B. Connection from Exhaust Pipe to Muffler: Stainless-steel expansion joint with liners.

C. Generator mufflers shall be mounted on the roof of the generator to isolate vibration, reduce heat build-up and to provide quality support.

D. Provide exhaust system from indoor generator out exterior wall of control house. Exhaust system and routing shall match that of existing generator exhaust system. Generator manufacturer shall field verify exact routing.

2.10 STARTING SYSTEM

A. Description: 24-V electric, dual starters, with negative ground and including the following items:

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Environmental Conditions" paragraph in "Service Conditions" article above.

2. Cranking Cycle: As required by NFPA 110 for system level specified.

3. Battery: Adequate capacity within ambient temperature range specified in "Environmental Conditions" Paragraph in "Service Conditions" Article above to provide specified cranking cycle at least three times without recharging. . Battery size shall be BCI Group No. 8D minimum, and shall be rated not less than 220 amp hours. Necessary cables and clamps shall be provided. Engines equipped with dual starting motors shall have dual battery banks.

4. Battery Cable: Size as recommended by generator set manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.

5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 45-A minimum continuous rating.

6. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit complies with UL 1236 and includes the following features:

a. Operation: Equalizing-charging rate of 20 A is initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit then automatically switches to a lower float-charging mode and continues operating in that mode until battery is discharged again.

b. Automatic Temperature Compensation: Adjusts float and equalizes voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.

c. Automatic Voltage Regulation: Maintains output voltage constant regardless of input voltage variations up to plus or minus 10 percent.

d. Ammeter and Voltmeter: Flush mounted in door. Meters indicate charging rates.

e. Safety Functions: Include sensing of abnormally low battery voltage arranged to close contacts providing low battery voltage indication on control and monitoring panel. Also include sensing of high battery voltage and loss of ac input or dc output of battery charger. Either condition closes contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

g. Charger shall operate on 120V.

2.11 CONTROL AND MONITORING

A. Provide a fully solid-state, microprocessor based, generator set control. The control panel shall be designed and built by the engine manufacturer. The control shall provide all operating, monitoring, and control functions for the generator set. The control panel shall provide real time digital communications to all engine and regulator controls via SAE J1939.

B. Environmental: The generator set control shall be tested and certified to the following environmental conditions:

1. –40°C to +70°C Operating Range
2. 95% humidity non-condensing, 30°C to 60°C
3. IP22 protection
4. 5% salt spray, 48 hours, +38°C, 36.8V system voltage
5. Sinusoidal vibration 4.3G's RMS, 24-1000Hz
6. Electromagnetic Capability (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)
7. Shock: withstand 15G

C. Functional Requirements: The following functionality shall be integral to the control panel:

1. The control shall include a minimum 64 x 240 pixel, 28mm x 100mm, white backlight graphical display with text based alarm/event descriptions
2. The control shall include a minimum of 3-line data display
3. Audible horn for alarm and shutdown with horn silence switch
4. Standard ISO labeling
5. Multiple language capability
6. Remote start/stop control
7. Local run/off/auto control integral to system microprocessor
8. Cooldown timer
9. Speed adjust
10. Lamp test
11. Push button emergency stop button
12. Voltage adjust
13. Voltage regulator V/Hz slope - adjustable
14. Password protected system programming

D. Digital Monitoring Capability: The controls shall provide the following digital readouts for the engine and generator. All readings shall be indicated in either metric or English units:

1. Engine

a. Engine oil pressure
b. Engine oil temperature
c. Engine coolant temperature
d. Engine RPM
e. Battery volts
f. Engine hours
g. Engine crank attempt counter
h. Engine successful start counter
i. Service maintenance interval
j. Real time clock

2. Generator
    a. Generator AC volts (Line to Line, Line to Neutral and Average)
    b. Generator AC current (Avg and Per Phase)
    c. Generator AC Frequency
    d. Generator kW (Total and Per Phase)
    e. Generator kVA (Total and Per Phase)
    f. Generator kVAR (Total and Per Phase)
    g. Power Factor (Avg and Per Phase)
    h. Total kW-hr
    i. Total kVAR-hr
    j. % kW
    k. % kVA
    l. % kVAR
3. Voltage Regulation
    a. Excitation voltage
    b. Excitation current

E. Alarms and Shutdowns: The control shall monitor and provide alarm indication and subsequent shutdown for the following conditions. All alarms and shutdowns are accompanied by a time, date, and engine hour stamp that are stored by the control panel for first and last occurrence:

1. Engine Alarm/Shutdown
    a. Low oil pressure alarm/shutdown
    b. High coolant temperature alarm/shutdown
    c. Loss of coolant shutdown

d. Overspeed shutdown
e. Overcrank shutdown
f. Emergency stop depressed shutdown
g. Low coolant temperature alarm
h. Low battery voltage alarm
i. High battery voltage alarm
j. Control switch not in auto position alarm
k. Battery charger failure alarm

2. Generator Alarm/Shutdown
   a. Generator over voltage
   b. Generator under voltage
   c. Generator over frequency
   d. Generator under frequency
   e. Generator reverse power
   f. Generator overcurrent
3. Voltage Regulator Alarm/Shutdown
   a. Loss of excitation alarm/shutdown
   b. Instantaneous over excitation alarm/shutdown
   c. Time over excitation alarm/shutdown
   d. Rotating diode failure
   e. Loss of sensing
   f. Loss of PMG

F. Inputs and Outputs
   1. Digital Inputs: The Controller shall include the ability to accept six (6) to eighteen (18) programmable digital input signals. The signals may be programmed for either high or low activation using programmable Normally Open or Normally Closed contacts.
   2. Digital Outputs: The control shall include the ability to operate six (6) programmable relay output signals, integral to the controller. The output relays shall be rated for 2A @ 30VDC and consist of six (6) Form A (Normally Open) contacts and two (10) Form C (Normally Open & Normally Closed) contacts.
   3. Discrete Outputs: The control shall include the ability to operate two (2) discrete outputs, integral to the controller, which are capable of sinking up to 300mA.

G. Maintenance: All engine, voltage regulator, control panel and accessory units shall be accessible through a single electronic service tool. The following maintenance functionality shall be integral to the generator set control
   1. Engine running hours display

2. Service maintenance interval (running hours or calendar days)
3. Engine crank attempt counter
4. Engine successful starts counter
5. 20 events are stored in control panel memory

H. Remote Communications

1. Remote Communications: The control shall include Modbus RTU and Ethernet communications as standard via RS-485. The remote communications shall also be capable of communicating Modbus RTU and Ethernet.
2. Remote Monitoring Software: The control shall provide Monitoring Software with the following functionality:
    a. Provide access to all date and events on generator set communications network
    b. Provide remote control capability for the generator set
    c. Ability to communicate via Modbus RTU and Ethernet.
3. Remote Indication: Provide a remote indication to SCADA.
    a. Provide the following individual digital outputs for the following indications for protection and diagnostics
        1). Overcrank
        2). Low coolant temperature
        3). High coolant temperature warning
        4). High coolant temperature shutdown
        5). Low oil pressure warning
        6). Low oil pressure shutdown
        7). Overspeed
        8). Low coolant level
        9). EPS supplying load
        10). Control switch not in auto
        11). High battery voltage
        12). Low battery voltage
        13). Battery charger AC failure
        14). Emergency stop
        15). Low Fuel Level
        16). Fuel Leak
        17). Spare
        18). Spare

b. The following additional metering shall be provided via Ethernet Communication protocol and Modbus RTU for each Engine:

1). Generator kW, kVA, kVAR, PF, Volts, Amps and frequency

2). Generator AC Amperes – Phase A, Phase B and Phase C

3). Generator AC Voltage – Phase A-B, Phase B-C, Phase C-A, Phase A, Phase B and Phase C (verify phase rotation)

4). Engine RPM Meter

5). Engine Battery Voltage Meter

6). Engine Oil Pressure Gauge

7). Engine Coolant Temperature Gauge

8). Engine Running Hour Meter

9). Engine Start Counter

10). Atmospheric Pressure

11). Boost Pressure

12). Air Filter Restriction

13). Left Turbo Inlet Pressure

14). Right Turbo Inlet Pressure

15). Engine Hour meter

16). Total Fuel Burned

17). Engine Coolant Level Status

18). Local Engine Control Switch Position

19). Overspeed Switch Status

20). Remote Emergency Stop Actuated

21). Percent Engine Load

22). Oil Filter Pressure Differential

23). Fuel Filter Pressure Differential

24). Aftercoolant Temperature

25). Right Exhaust Temperature

26). Left Exhaust Temperature

27). Crankcase Air Pressure

28). Filtered Fuel Pressure

29). Right Air Filter Restriction

30). Left Air Filter Restriction

31). Fuel Consumption Rate

32). Engine Oil Temperature.

2.12 GENERATOR TERMINAL BOX

A. The manufacturer shall make accommodations in the generator termination section for the generator conductors. The generator circuit breaker shall be bottom entry for the generator conductors and conduit. Generator conductors and conduit shall be as follows.

Generator	Cable requirements with phase and ground conductors
GEN	4#1, #6. G., 2”C. & 3 #4, #8G., 1.5” C.

2.13 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.

B. Tripping Characteristic: Designed specifically for generator protection.

C. Trip Rating: Matched to generator rating.

D. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.

E. Mounting: Adjacent to or integrated with control and monitoring panel

2.14 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1 and specified performance requirements.

B. Drive: Generator shaft is directly connected to engine shaft. Exciter is rotated integrally with generator rotor.

C. Electrical Insulation: H.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction prevents mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. The permanent magnet excitation system shall enable the alternator to sustain 300% of rated current for ten seconds during a fault condition and shall improve the immunity of the voltage regulator to non-linear distorting loads.

G. Enclosure: Open Drip proof.

H. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding. Temperature rise of rotor and stator at full load shall not exceed 125°C in a 40°C ambient.

I. Voltage Regulator: The digital voltage regulator shall be microprocessor based with fully programmable operating and protection characteristics. The regulator shall maintain generator output voltage within +/- 0.5% for any constant load between no load and full load. The regulator shall be capable of sensing true RMS in three phases of alternator output voltage. The voltage regulator shall include a VAR/Pf control feature as standard. The regulator shall provide an adjustable dual slope regulation characteristic in order to optimize voltage and frequency response for site conditions. The voltage regulator shall communicate with the Generator Control Panel via a J1939 communication network with generator voltage adjustments made via the controller keypad. Additionally, the controller shall allow system parameter setup and monitoring, and provide fault alarm and shutdown information through the controller.

J. Space heater with thermostat to keep generator windings above dew point.

K. VIBRATION ISOLATION DEVICES: Supply vibration isolators as recommended by the manufacturer.

2.15 FINISHES

A. Indoor Generator and Components: Manufacturer's standard enamel over corrosion-resistant pretreatment and compatible standard primer.

2.16 FUEL MAINTENANCE SYSTEM

A. Fuel storage tank shall include two stage fuel maintenance system that will remove dirt and water. The maintenance system shall be plumbed into the tank per the manufacturers recommendations.

B. The separator shall remove 99.9% of the water in the fuel line and 95% of the solids.

C. The stabilizer shall decontaminate and stabilize the fuel without the use of chemical additives.

D. The system shall operate on 120V, 1 phase, 60HZ, 20A circuit breaker.

E. Programmable controller:

1. The controller shall be a UL 508 listed assembly.

2. Provide dry contact for general alarms.

F. The system shall be capable of treating the maximum amount of fuel that the entire sub-base tank fuel system is capable of being filled with. Acceptable manufacturer is Fuel Technologies International LLC product number FTI-2.8.

G. The fuel tank shall be provided with all the necessary and required pipe and fittings for installation and proper operation of the system.

H. Fuel maintenance panel shall be housed in a NEMA 3R, 316 stainless steel enclosure.

2.17 SOURCE QUALITY CONTROL

A. Project-Specific Equipment Tests: Factory test engine generator set and other system components and accessories before shipment. Perform tests at rated load and power factor. Include the following tests.

1. Full load run.
2. Maximum power.
3. Voltage regulation.
4. Transient and steady-state governing.
5. Single-step load pickup.
6. Safety shutdown.

2.18 SOURCE QUALITY CONTROL.

A. Project-Specific Equipment Tests: Factory test engine generator set and other system components and accessories before shipment. Perform tests at rated load and power factor. Include the following tests

1. Full load run.
2. Maximum power.
3. Voltage regulation.
4. Transient and steady-state governing.
5. Single-step load pickup.
6. Safety shutdown

3.00 EXECUTION

3.01 EXAMINATION

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

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine roughing-in of electrical connections. Verify actual locations of connections before packaged engine generator installation.

3.02 INSTALLATION

A. Generator to be installed by a Construction Contractor to be determined at a later date.

3.03 CONNECTIONS

A. Ground Equipment

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Manufacturer’s representative shall be available to advise and assist the installation of the generators by the Construction Contractor.

B. Furnish the services of a competent manufacturer’s service representative who shall be experienced in the assembly and wiring of the generator units of similar size and character. He shall direct the installation of the equipment and shall assist and advise with the electricians or other workmen who are performing the actual work of installing the generator units. He also shall assist in the adjustment and testing of the equipment.

C. Startup procedures, testing and troubleshooting of the generator shall be performed under the supervision of the manufacturer's representative. Energization of the generators shall not be permitted without the manufacturer's representative permission

D. Time spent on the job by the service representative shall be adequate for performing all functions described herein.

E. All costs (travel expenses, testing equipment, etc.) required for testing start-up, and training shall be the responsibility of the equipment manufacturer/Contractor

F. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to assist in testing. Report results in writing. Provide on site field service for start-up.

G. Testing: Perform field quality-control testing under the supervision of the manufacturer's factory-authorized service representative.

H. Tests: Include the following:

1. Tests recommended by manufacturer, including under load tests. The engine distributor shall furnish all equipment and personnel required for testing, including load banks, transformer and cable.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, the following:

a. Single-step full-load pickup test.

b. 4-hour load bank test.

3. Battery Tests: Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery. Verify acceptance of charge for each element of battery after discharge. Verify measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
7. Perform a reactive load bank test of each generator set at full load and 0.80 power factor for 4 hours at full load. Record system data at 15 minute intervals as recommended by the engine manufacturer.
8. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within
9. Perform a load test with actual designed connected loads at the site with the generator connected to the 480V automatic transfer switch and operating at designed load for 4 hours at 0.80 power factor.
10. The installation Contractor shall provide fuel for the testing and any subsequent re-testing of the generator and shall top off the fuel tank upon final completion.

I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

K. All Generator Testing Report(s) shall be submitted to Engineer for approval no later than two weeks after testing has been conducted.

L. Test instruments shall have been calibrated within the last 12 months, traceable to standards of the National Institute for Standards and Technology, and adequate for making positive observation of test results. Make calibration records available for examination on request.

3.05 COMMISSIONING

A. Battery Equalization: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

3.06 CLEANING

A. On completion of installation, inspect system components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

3.07 TRAINING

A. All costs (travel expenses, testing equipment, etc.) required for testing, start-up, and training shall be the responsibility of the generator manufacturer.

B. Training shall include theory of operation, application and trouble shooting. A training outline and manual of training course material shall be provided to the Owner two weeks in

advance of the course. Provide one 2-hour training class on operation and maintenance of the generator. Training session shall be conducted by Generator manufacturer personnel. Training session shall be scheduled and coordinated with the Owner.

C. Instruct the operating and maintenance personnel in principle of operating of all major devices and the care and maintenance of components included in the generator units, for a period of not less than two (2) hours. The training shall take place at the Owner's main office. Coordinate with Owner for exact requirements and dates for training.

D. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators as specified below:

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
2. Review data in maintenance manuals. Review data in maintenance manuals.
3. Schedule training with Owner, with at least seven days advance notice.
4. Minimum Instruction Period: Two hours.
5. Training shall not take place until construction is complete and generator online and fully operational.

E. When requested within the equipment warranty period, provide an additional training session for 2 hours from that indicated above for the Owner's Representative at the jobsite or other office location chosen by the Owner. Training sessions shall be scheduled and coordinated with the Owner.

END OF SECTION

ATTACHMENT A - SUBMITTAL DATA SHEET FOR
26 32 13, ENGINE GENERATORS

Submit the following data with Bid Proposal and with Shop Drawing:

Item No.	Description	480V Generator For Spillway
1	Manufacturer of Generator:	
2	Total Equipment Dimensions for Generator(inches): Length x Width x Height	
3	Total (weight) Weight (lbs.):	
4	Fuel Consumption (gallons/hour)	_____at 25% generator KW rating _____at 50% generator KW rating _____at 75% generator KW rating _____at 100% generator KW rating
5	Capacity of External Fuel Tank (gallons)	
6	External Fuel Tank Dimensions (inches) & Weight: Length x Width x Height Weight (lbs) – Dry Weight (lbs) – Wet	

END OF ATTACHMENT

26 36 00 TRANSFER SWITCHES

1.00 GENERAL

1.01 WORK INCLUDED

A. This Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.

2. Remote annunciation systems.

3. Remote annunciation and control systems.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, weight, installed features and devices, and material lists for each switch specified.

1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

2. Provide AIC rating of ATS.

C. Provide written verification that ATS manufacturer has coordinated with generator manufacturer, see Specification 26 32 13, Engine Generators, so the two systems are compatible to work with each other.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.

2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain automatic transfer switches and nonautomatic transfer switches, remote annunciator and control systems through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA ICS 10.

D. Comply with NFPA 70.

E. Comply with NFPA 99.

F. Comply with NFPA 110.

G. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.04 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace transfer switch and auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of delivery.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Contactor Transfer Switches:

a. Emerson; ASCO Power Technologies, LP.

b. GE Zenith Controls.

c. Russelectric, Inc.

d. Onan.

2. Transfer Switches Using Molded-Case Switches or Circuit Breakers:

a. Eaton Electrical Inc.; Cutler-Hammer.

b. GE Zenith Controls.

c. Hubbell Industrial Controls, Inc.

d. Onan.

2.02 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Transfer switch shall combine all functions of an automatic transfer switch. The switch shall be three-pole or four-pole as shown on plans, rated for the amperage at 480 V, as shown on plans and be able to withstand and close into a fault current of 65,000 RMS symmetrical amps, no exceptions, without any damage or contact welding according to UL-1008.

B. Transfer switch shall be service rated for use as a service entrance as required.

C. Transfer switch shall have an AIC rating of 65,000 amps.

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

E. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

F. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

G. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

H. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

I. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.

2. Switch Action: Double throw; mechanically held in both directions.

3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

J. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

K. Neutral Terminal: Solid and fully rated, unless otherwise indicated.

L. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.

M. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

N. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 Section "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.

2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.

3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

O. Enclosures: The transfer switch shall be housed in a wall mounted enclosure. General-purpose NEMA 250, Type NEMA 12 steel enclosure, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.03 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

F. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

G. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.

H. Motor Disconnect and Timing Relay: Controls designate starters, so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.

I. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.

3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

5. Test Switch: Simulate normal-source failure.

6. Switch-Position Pilot Lights: Indicate source to which load is connected.

7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.

12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.

b. Push-button programming control with digital display of settings.

c. Integral battery operation of time switch when normal control power is not available.

2.04 REMOTE ANNUNCIATOR SYSTEM

A. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches. Annunciation shall include the following:

1. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.

2. Switch position.

3. Switch in test mode.

4. Failure of communication link.

B. Annunciator Panel: LED-lamp type with audible signal and silencing switch.

1. Indicating Lights: Grouped for each transfer switch monitored.

2. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.

3. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.

4. Lamp Test: Push-to-test or lamp-test switch on front panel.

2.05 REMOTE ANNUNCIATOR AND CONTROL SYSTEM

A. Functional Description: Include the following functions for indicated transfer switches:

1. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.

2. Indication of switch position.

3. Indication of switch in test mode.

4. Indication of failure of digital communication link.

5. Key-switch or user-code access to control functions of panel.

6. Control of switch-test initiation.

7. Control of switch operation in either direction.

8. Control of time-delay bypass for transfer to normal source.

B. Malfunction of annunciator, annunciation and control panel, or communication link shall not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically reverts to stand-alone, self-contained operation. Automatic transfer-switch sensing, controlling, or operating function shall not depend on remote panel for proper operation.

C. Remote Annunciation and Control Panel: Solid-state components. Include the following features:

1. Controls and indicating lights grouped together for each transfer switch.

2. Label each indicating light control group. Indicate transfer switch it controls, location of switch, and load it serves.

3. Digital Communication Capability: Matched to that of transfer switches supervised.

4. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.

2.06 SOURCE QUALITY CONTROL

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

3.00 EXECUTION

3.01 INSTALLATION

A. Transfer switch to be installed by a Construction Contractor to be determined at a later date.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.

2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

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

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.

b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

   a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.

   b. Simulate loss of phase-to-ground voltage for each phase of normal source.

   c. Verify time-delay settings.

   d. Verify pickup and dropout voltages by data readout or inspection of control settings.

   e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.

   f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

   g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

   a. Verify grounding connections and locations and ratings of sensors.

C. Testing Agency's Tests and Inspections:

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

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

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

   a. Check for electrical continuity of circuits and for short circuits.

   b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

   c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

   a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.

   b. Simulate loss of phase-to-ground voltage for each phase of normal source.

   c. Verify time-delay settings.

   d. Verify pickup and dropout voltages by data readout or inspection of control settings.

   e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.

   f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

   g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

   a. Verify grounding connections and locations and ratings of sensors.

D. Coordinate tests with tests of generator and run them concurrently.

E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

F. Remove and replace malfunctioning units and retest as specified above.

3.03 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.

B. Coordinate this training with that for generator equipment.

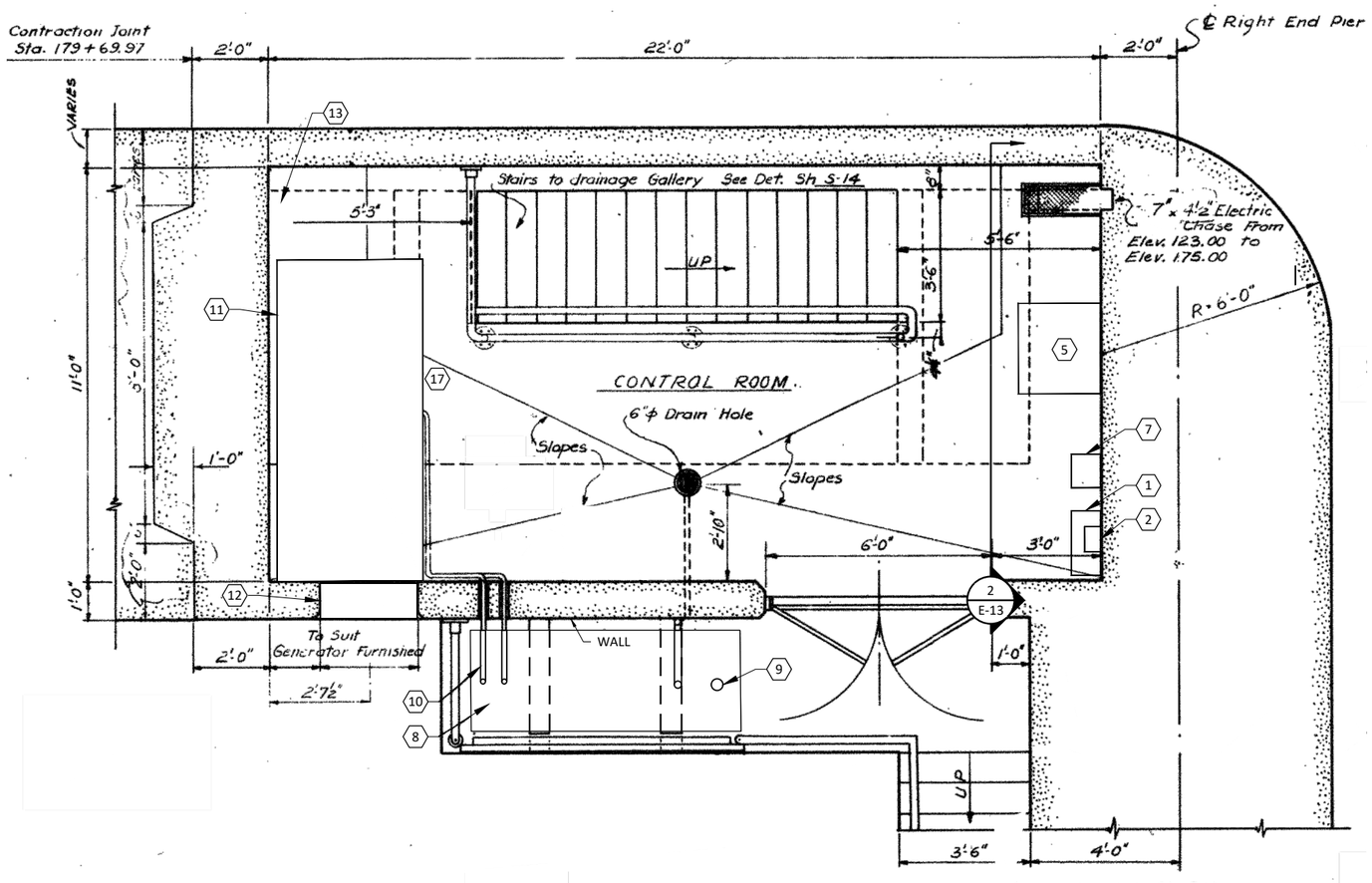
END OF SECTION

GENERAL NOTES:

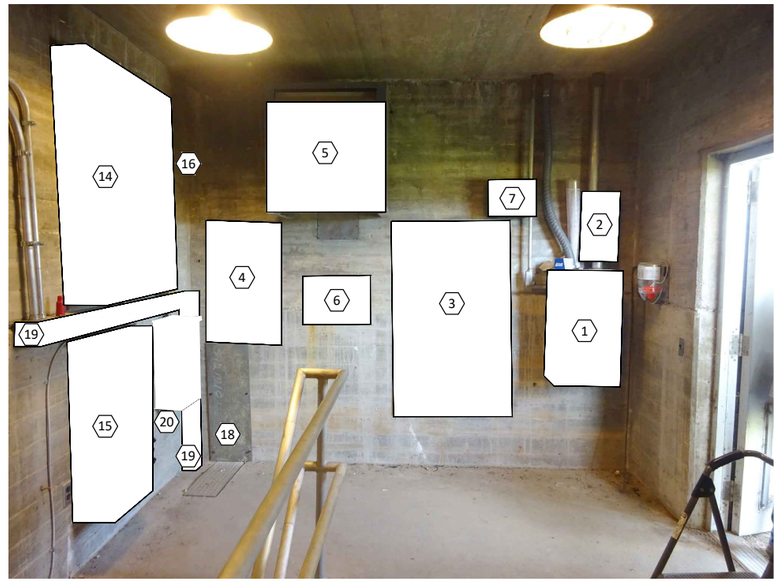
1. CONTRACTOR SHALL BOND EXISTING EQUIPMENT-75KVA TRANSFORMER, PANELBOARDS, GENERATOR, ETC. TO EXISTING GROUND GRID AT SPILLWAY AND GROUND IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. ALL GROUNDING SHALL BE SIZED PER THE NATIONAL ELECTRICAL CODE. FIELD VERIFY LOCATION OF EXISTING GROUND GRID AT SPILLWAY.
2. CONTRACTOR SHALL TEMPORARILY REMOVE HANDRAILS, DOORS, AND OTHER EQUIPMENT AS REQUIRED FOR THE INSTALLATION OF THE NEW GENERATOR, FUEL TANK AND ASSOCIATED EQUIPMENT. RESTORE TO ORIGINAL CONDITION ONCE ALL WORK HAS BEEN COMPLETED. CONTRACTOR SHALL FIELD VERIFY NEW EQUIPMENT CAN BE INSTALLED IN EXISTING SPACE DURING EQUIPMENT SUBMITTAL REVIEW PHASE PRIOR TO ORDERING EQUIPMENT. FIELD VERIFY ALL DIMENSIONS PRIOR TO EQUIPMENT SUBMITTAL REVIEW STAGE.
3. PROPERLY SEAL ALL WALL PENETRATIONS.

NOTES BY SYMBOL "⬡"

1. 200A, 3P AUTOMATIC TRANSFER SWITCH (ATS), NEMA 12 ENCLOSURE.
2. 200A FUSED DISCONNECT SWITCH IN NEMA 12 ENCLOSURE.
3. 480V RECESSED PANELBOARD, DP-1.
4. 208Y/120V RECESSED PANELBOARD, LP-1.
5. 75KVA, 480-208Y/120V TRANSFORMER T1. CONTRACTOR SHALL PROVIDE 316 STAINLESS STEEL UNISTRUT SUPPORTS AS REQUIRED TO PROPERLY SUPPORT TRANSFORMER.
6. NEMA 12 LIGHTING CONTACTOR FOR OUTDOOR LIGHTS.
7. GENERATOR CONTROL PANEL, PROVIDE CABLE AND CONDUITS AS REQUIRED FROM GENERATOR.
8. DIESEL FUEL TANK. FIELD VERIFY AREA ALLOCATED FOR FUEL TANK AND DIMENSIONS OF NEW TANK PRIOR TO ORDERING. APPROXIMATE DIMENSIONS OF TANK SHALL BE 48" WIDE, 96" LONG, 40" TALL. TANK SHALL BE DOUBLE WALL, U.L. 142 WITH 72 HOUR RUN CAPACITY. TANK SHALL BE LOCATED 5'-0" FROM WALL
9. TANK FILL CAP.
10. FUEL LINE. COORDINATE WITH GENERATOR MANUFACTURER FOR ALL REQUIREMENTS. FUEL PIPING SHALL BE ASTM A53/A53M SCHEDULE 40 BLACK STEEL, TYPE E OR S, GRADE B. PROVIDE THREADED FITTINGS AND JOINTS ON PIPE SIZES 2" AND SMALLER. PROVIDE WELDED FITTINGS AND JOINTS ON ALL PIPING LARGER THAN 2".
11. 60KW, 480Y/277V GENERATOR.
12. GENERATOR AIR EXHAUST. MODIFY OPENING IN WALL AS REQUIRED. COORDINATE WITH GENERATOR MANUFACTURER FOR REQUIREMENTS. PROVIDE GALVANIZED DUCTWORK FOR RADIATOR EXHAUST WITH FLEXIBLE DUCT CONNECTION BETWEEN DUCTWORK AND RADIATOR SHROUD. SIZE DUCTWORK BASED ON MANUFACTURER'S RADIATOR AIRFLOW REQUIREMENTS. FOR THE GENERATOR EXHAUST PIPING PROVIDE MINIMUM OF 4" THICK CALCIUM SILICATE INSULATION FOR EXHAUST PIPING. FOR PROVIDE NEW DIRECT DRIVE WALL MOUNTED EXHAUST FAN ON EXISTING OPENING: 800 CFM @ 0.1 ESP, 1/4 HP, 120V/1/60. MODIFY EXISTING OPENING AS REQUIRED FOR NEW FAN. FIELD VERIFY EXISTING CONDITIONS. LOUVER IS LOCATED JUST ABOVE HE GENERATOR EXHAUST PIPING. REFER TO EXISTING SPILLWAY DRAWING S12 LOCATED IN REFERENCE DRAWINGS FOR LOCATION OF OPENING. PROVIDE MANUAL ON/OFF SWITCH FOR FAN. FAN IS TO RUN ALL THE TIME. PROVIDE 2#12, #12G. IN ¾" CONDUIT FROM FAN TO PANEL LP-1.
13. GENERATOR BATTERY CHARGER. PROVIDE 120V, 20A CKT. FROM PANELBOARD, LP-1. PROVIDE 2 #10, #10G., 3/4"C. FROM PANEL LP-1 TO BATTERY CHARGER. FIELD VERIFY LOCATION TO INSTALL. PROVIDE CABLES/CONDUIT AS REQUIRED. PROVIDE MOUNTING HARDWARE AS REQUIRED.
14. RELIEF WELLS NO.4 & NO.10 LEVEL CONTROL PANEL.
15. RELIEF WELL NO.4 & NO.10 PUMPS COMBINATION STARTER PANEL.
16. CONTRACTOR SHALL LEAVE ENOUGH SPACE ON WALL TO INSTALL FUTURE LEVEL CONTROL PANEL OF SAME SIZE AS THAT BEING INSTALLED UNDER THIS PROJECT.
17. EXISTING GROUND FOR GENERATOR. CONTRACTOR SHALL EXTEND EXISTING BARE COPPER GROUND AS REQUIRED AND BOND TO GENERATOR. CONDUCTOR EXTENSION SHALL BE VIA EXOTHERMIC WELD PROCESS. GROUND CONDUCTOR SIZE SHALL MATCH THAT OF EXISTING AND BE #4//0 MINIMUM. FIELD VERIFY EXISTING LOCATION.
18. EXISTING ELECTRICAL CHASE.
19. NEMA 12 WIREWAY. SIZE AS REQUIRED PER THE NATIONAL ELECTRICAL CODE.
20. CONTRACTOR SHALL LEAVE ENOUGH SPACE ON WALL ADJACENT TO STARTER PANEL TO INSTALL STARTER PANEL ASSOCIATED WITH FUTURE RELIEF WELL PUMPS.



1 - CONTROL ROOM FLOOR PLAN
NOT TO SCALE



2 - CONTROL ROOM WALL ELEVATION
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FREESE NICHOLS
4055 International Plaza, Suite 200
Fort Worth, Texas 76109-4895
Phone - (817) 735-7300
Web - www.freese.com

SABINE RIVER AUTHORITY
TOLEDO BEND PROJECT
SPILLWAY ELECTRICAL IMPROVEMENTS
ELECTRICAL
CONTROL ROOM FLOOR PLAN

NO.	ISSUE	BY	DATE

F&N JOB NO. SRA19480
DATE MAR 2021
DESIGNED HDW
DRAWN JTR
REVISED
CHECKED TWZ
FILE NAME EL-CTR-PL-ROOM.dwg

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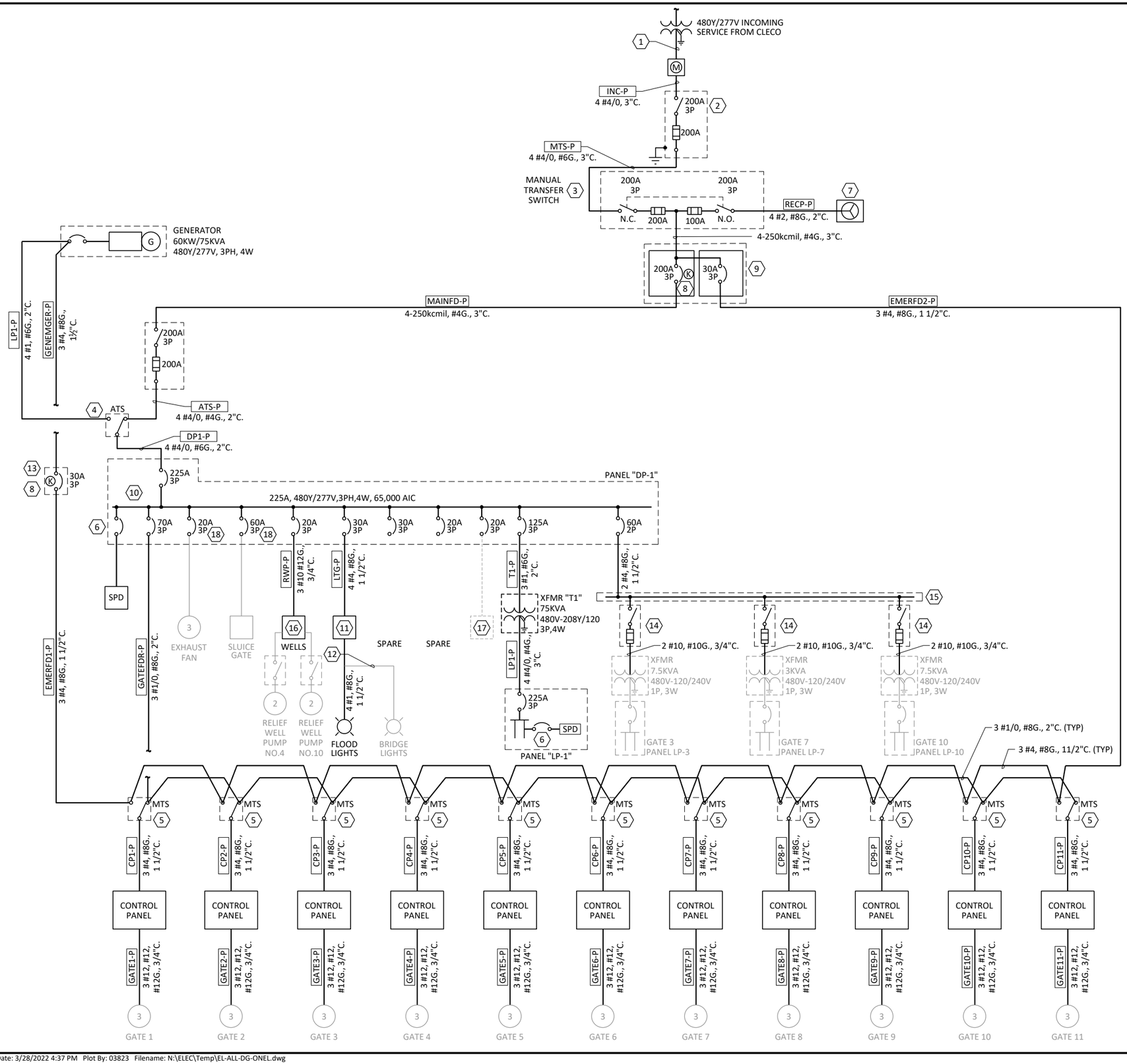

GENERAL NOTES:

1. EXISTING SHOWN LIGHT. WORK PROVIDED UNDER THIS CONTRACT IS SHOWN DARK.
2. COORDINATE ALL ELECTRICAL SERVICE REQUIREMENTS WITH CLECO POWER LLC, DREW MARONEY, PH: 318-308-9150.

NOTES BY SYMBOL "⬡"

1. CONTRACTOR SHALL PROVIDE 3" CONDUIT, PVC SCHEDULE 40 FROM METER BASE INSTALLED ON ELECTRICAL EQUIPMENT RACK TO CLECO POLE MOUNTED TRANSFORMERS COORDINATE ALL REQUIREMENTS WITH CLECO.
2. PROVIDE HEAVY DUTY 200A FUSED DISCONNECT SWITCH WITH 200A FUSES WITH A SERVICE ENTRANCE RATING IN A NEMA 4X, 316 STAINLESS STEEL ENCLOSURE.
3. HEAVY DUTY DOUBLE THROW FUSED MANUAL TRANSFER SWITCH (MTS), 480Y/277V, IN A NEMA 3R, 316 STAINLESS STEEL ENCLOSURE. MANUFACTURER SHALL BE EATON, CATALOG NUMBER: DT-3-6-200-F-F-R-K-LC OR APPROVED EQUAL.
4. NEMA 12, 200A AUTOMATIC TRANSFER SWITCH, 65,000AIC.
5. HEAVY DUTY, MANUAL TRANSFER SWITCH, 30A, 3P IN A NEMA 4X, 316 STAINLESS STEEL ENCLOSURE.
6. COORDINATE CIRCUIT BREAKER SIZE AND CONDUCTOR SIZE WITH SPD MANUFACTURER.
7. 100A, 3PH, 4W, RECEPTACLE, COOPER CROUSE-HINDS ARKTITE HEAVY DUTY RECEPTACLE, NEMA 4X, COPPER-FREE ALUMINUM METALLIC HOUSING, RECEPTACLE ASSEMBLY, MODEL AREA 10404-S22. RECEPTACLE ASSEMBLY SHALL BE MOUNTED TO NEMA 4X, 316 STAINLESS STEEL JUNCTION BOX. PROVIDE FORMAL SUBMITTAL ON RECEPTACLE AND HOUSING AND INSTALLATION TO NEMA 4X JUNCTION BOX FOR OWNER AND ENGINEER'S REVIEW AND APPROVAL. CONNECTORS SHALL BE SUITABLE FOR USE WITH OWNERS PORTABLE GENERATOR. FIELD VERIFY EXISTING SO NEW CONNECTORS ARE COMPATIBLE.
8. BREAKERS ARE KIRK-KEY INTERLOCKED. PROVIDE KIRK-KEY INTERLOCKS ON BREAKERS COORDINATE WITH BREAKER MANUFACTURER ON STYLE TO USE.
9. CIRCUIT BREAKER TAP BOX, NEMA 4X, 316 STAINLESS STEEL BOX TO HOUSE INDIVIDUAL CIRCUIT BREAKERS. BREAKERS SHALL BE HOUSED IN A NEMA 1 ENCLOSURE. INSIDE TAP BOX.
10. PANEL SHALL BE 42 POLE PANEL. RECONNECT EXISTING CONDUCTORS NOT BEING REPLACED TO NEW PANEL. BREAKER SIZES IN PANEL ARE BASED OFF EXISTING INSTALLATION. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING LOADS BEING FED FROM EXISTING PANEL AND NOTIFY ENGINEER OF ANY EXISTING LOADS NO LONGER FED FROM PANEL. CONTRACTOR SHALL FIELD VERIFY WHAT EACH EXISTING BREAKER FEEDS PRIOR TO PURCHASING BREAKER PANEL.
11. LIGHTING CONTACTOR.
12. RECONNECT EXISTING CONDUCTORS TO LIGHTING CONTACTOR.
13. NEMA 12 ENCLOSURE. MOUNT AT GENERATOR, 65,000AIC.
14. PROVIDE HEAVY DUTY 30A FUSED DISCONNECT SWITCH WITH 25A FUSE FOR 7.5kVA TRANSFORMERS AND 10A FUSE FOR 3KVA TRANSFORMER.
15. NEMA 4X 316 STAINLESS STEEL WIREWAY. LOCATE UNDER GATE 7 CANOPY. FIELD VERIFY LOCATION TO INSTALL. COORDINATE WITH OWNER FOR EXACT LOCATION.
16. MOTOR STARTER PANEL FOR RELIEF WELL PUMPS NO.4 AND NO.10 PANEL SHALL BE PROVIDED WITH MAIN CIRCUIT BREAKER AND INDIVIDUAL MCP'S FOR EACH STARTER.
17. STARTER PANEL FOR FUTURE RELIEF WELL PUMPS.
18. RECONNECT EXISTING CONDUCTORS TO NEW PANEL. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDUCTOR SIZE AND LET ENGINEER KNOW PRIOR TO SUBMITTING SHOP DRAWINGS ON PANEL.

1 - ONE-LINE DIAGRAM
NOT TO SCALE

Freese and Nichols, Inc. Texas Registered Engineering Firm F-2144
Freese and Nichols, Inc. LA Registered Engineering Firm LF - 6000841

NOT FOR CONSTRUCTION
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF REVIEW AND UNDER THE AUTHORITY OF: JEFFREY N. HENSLEY P.E. TEXAS NO. 84677 ON DATE: 3/28/2022 IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

FREESE NICHOLS
4055 International Plaza, Suite 200
Fort Worth, Texas 76109-4895
Phone - (817) 735-7300
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SABINE RIVER AUTHORITY
TOLEDO BEND PROJECT
SPILLWAY ELECTRICAL IMPROVEMENTS
ELECTRICAL
ONE-LINE DIAGRAM

NO.	ISSUE	BY	DATE

R&H JOB NO.	SRA19480
DATE	MAR 2021
DESIGNED	JNH
DRAWN	JTR
REVISED	
CHECKED	TWZ
FILE NAME	EL-ALL-DG-ONEL.dwg

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LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOG NO.	VOLT.	DESCRIPTION	LAMPS	INPUT WATTS
A	HOLOPHANE	EMS L48 4000LM IMAFD WD XX 50K 80CRI	120V	EMS L48 4000LM IMAFD WD XX 50K 80CRI	LED	29.78
B	HOLOPHANE	PLLED 9 5K 10A 44	277V	Predator Large LED with 9 COBs, 5000k color temperature, 1050mA Drive Current, 4X4 Distribution	LED	391
C	HOLOPHANE	PLSLED PK3 MVOLT MFL 50K 3 BZSDP	120V	Predator Small LED 14000 Lumen Package, Medium Floodlight Distribution with Yoke Stainless Steel Mounting	LED	118.8
D	RIG-A-LITE	AVP20L2UHRRGW50	120V	Globe light with guard. A360 aluminum body and guard, stainless steel hardware, borosilicate red glass globe, 5000K, NEMA 4X, UL1598 & UL1598A listed, 5 year warranty.	LED	20

(1)

PANEL NO. LP-1 — MAIN 225 AMPS M.C.B. — LOCATION SPILLWAY CONTROL ROOM
SERVICE VOLTAGE 208Y/120 VOLTS — BUS RATING 225 AMPS
A.I.C. 14,000 — NEUTRAL BUS 225 AMPS — FEED FROM T1

DESCRIPTION	BREAKER POLE	BREAKER AMP	VOLT AMPS A	VOLT AMPS B	VOLT AMPS C	CKT NO	BUSS CONN	CKT NO	VOLT AMPS A	VOLT AMPS B	VOLT AMPS C	BREAKER POLE	BREAKER AMP	DESCRIPTION
HOIST CANOPY LIGHTS	1	30				1		2				1	20	ROADWAY LIGHTS
HOIST CANOPY LIGHTS	1	20				3		4				1	20	ROADWAY LIGHTS
HOIST CANOPY LIGHTS	1	30				5		6				1	20	ROADWAY LIGHTS
HOIST CANOPY LIGHTS	1	30				7		8				1	20	GALLERY LIGHTS
OUTSIDE SUMP PNL	1	30				9		10				1	30	GALLERY LIGHTS
OUTSIDE WALL LIGHTS	1	30				11		12				1	30	GALLERY LIGHTS
GALLERY RECPT. & SUMP PUMP	2	50				13		14				1	20	CONTROL ROOM LIGHTS
						15		16				1	20	CONTROL ROOM RECPT.
HOIST CANOPY LIGHTS	1	20				17		18				1	20	EX. FAN CONTROL RM
HOIST CANOPY LIGHTS	1	20				19		20				1	20	PHOTOCELL/NAVIGATION LIGHTS
HOIST CANOPY LIGHTS	1	20				21		22				1	20	LOW FLOW VALVE CONTROL PANEL
HOIST CANOPY LIGHTS	1	20				23		24				1	20	WARNING HORN
HOIST CANOPY LIGHTS	1	20				25		26				1	20	STAIR LIGHTS
HOIST CANOPY LIGHTS	1	20				27		28				1	20	RELIEF WELL NO.4 & NO.10 CONTROL PNL
HOIST CANOPY LIGHTS	1	20				29		30				1	20	STAIR LIGHTS
GENERATOR RUN BEACON	1	20				31		32				1	20	RELIEF WELL HIGH LEVEL BEACON
SPARE	1	20				33		34				1	20	SPARE
SPARE	1	20				35		36				1	20	SPARE
SPARE	1	20				37		38						
SPARE	1	20				39		40				(3)		SPD
SPARE	1	20				41		42						

CONNECTED BUS A ____ VA — CONNECTED BUS B ____ VA — CONNECTED BUS C ____ VA
0 0 0 — TOTAL: ____ VA
DEMAND KVA: ____ — DEMAND AMPS: ____
NOTE: * INDICATES GFI BREAKER

PANEL NO. EXISTING LP-3 — MAIN 30 AMPS — LOCATION SPILLWAY-GATE 3
SERVICE VOLTAGE 120/240 VOLTS — BUS RATING 125 AMPS
A.I.C. 10,000 — NEUTRAL BUS 125 AMPS — FEED FROM 7.5KVA XFMR @ GATE 3

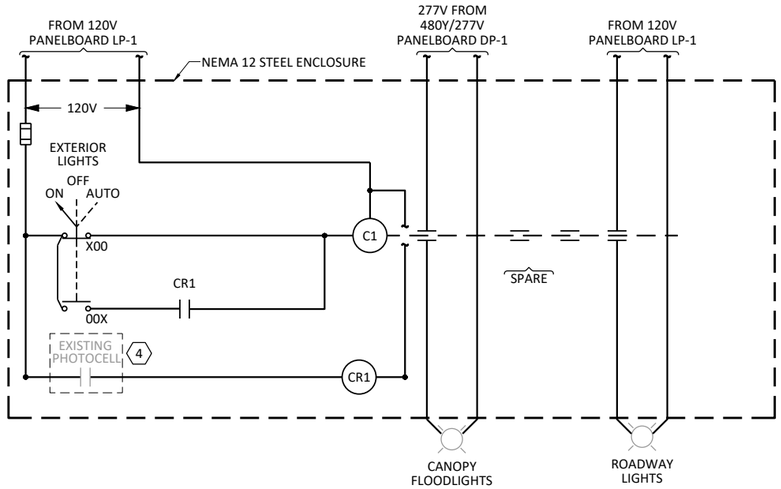
DESCRIPTION	BREAKER POLE	BREAKER AMP	VOLT AMPS A	VOLT AMPS B	CKT NO	BUSS CONN	CKT NO	VOLT AMPS A	VOLT AMPS B	BREAKER POLE	BREAKER AMP	DESCRIPTION
MAIN BREAKER	2	30			1		2			1	20	GATE 1 AMALGAMATOR/ INCLINOMETER CNTL PNL
					3		4			1	20	GATE 3 AMALGAMATOR/ INCLINOMETER CNTL PNL
GATE 4 AMALGAMATOR/ INCLINOMETER CNTL PNL	1	20			5		6			1	20	GATE 2 AMALGAMATOR/ INCLINOMETER CNTL PNL
SPACE					7		8			1	20	GATE 5 AMALGAMATOR/ INCLINOMETER CNTL PNL
SPACE					9		10					SPACE
SPACE					11		12					SPACE

(2)

CONNECTED BUS A 0 VA — CONNECTED BUS B 0 VA
0 0 — TOTAL: 0 VA
DEMAND KVA: 0.0 — DEMAND AMPS: 0.0
NOTE: ** INDICATES ITEMS UNDER THIS CONTRACT

NOTES BY SYMBOL "⬡"

1. BREAKER SIZES IN PANELBOARD ARE BASED OFF EXISTING INSTALLATION. CONTRACTOR SHALL FIELD VERIFY BREAKER SIZES PRIOR TO PURCHASING BREAKER PANEL. CONTRACTOR SHALL FIELD VERIFY WHAT EACH BREAKER POWERS AND PROVIDE UPDATED PANELBOARD SCHEDULE. PROVIDE NEW CABLE FROM PANELBOARD TO CANOPY LIGHTS, RECEPTACLES, BEACON LIGHT, HORN, ETC. AS REQUIRED. FIELD VERIFY EXISTING CIRCUITRY. ALL CABLE INCLUDING GROUND SHALL BE SIZED PER THE NATIONAL ELECTRICAL CODE.
2. EXISTING PANELBOARDS SHOWN FOR INFORMATION ONLY. CONTRACTOR SHALL FIELD VERIFY LOADS FED BY EACH BREAKER AND PROVIDE UPDATED TYPED PANELBOARD SCHEDULE FOR EACH PANEL.
3. PROVIDE PROPERLY SIZED BREAKER FOR SPD.
4. RECONNECT EXISTING CABLE ASSOCIATED WITH PHOTOCELL TO NEW LIGHTING CONTACTOR.



NO.1 GENERAL NOTES
1. CONTACTS SHALL BE RATED FOR 30 AMPS AT 120V OR 277V UNLESS OTHERWISE NOTED.
2. PROVIDE SPARE CONTACTS FOR EACH CONTACTOR.

(1) / (-) EXTERIOR LIGHTING CONTROL SCHEMATIC
NOT TO SCALE

(2) PANEL NO. EXISTING LP-7 — MAIN 30 AMPS — LOCATION SPILLWAY-GATE 7
SERVICE VOLTAGE 120/240 VOLTS — BUS RATING 125 AMPS
A.I.C. 10,000 — NEUTRAL BUS 125 AMPS — FEED FROM 3KVA XFMR @ GATE 7

DESCRIPTION	BREAKER POLE	BREAKER AMP	VOLT AMPS A	VOLT AMPS B	CKT NO	BUSS CONN	CKT NO	VOLT AMPS A	VOLT AMPS B	BREAKER POLE	BREAKER AMP	DESCRIPTION
AMALGAMATOR/INCLINOMETER CONTROL PANEL	1	20			1		2			2	30	MAIN BREAKER
GATE X	1	20			3		4					
SPACE					5		6					SPACE
SPACE					7		8					SPACE

CONNECTED BUS A 0 VA — CONNECTED BUS B 0 VA
0 0 — TOTAL: 0 VA
0 0 — DEMAND KVA: 0.0 — DEMAND AMPS: 0.0
NOTE: ** INDICATES ITEMS UNDER THIS CONTRACT
NOTE: * INDICATES GFI BREAKER

(2) PANEL NO. EXISTING LP-10 — MAIN 30 AMPS — LOCATION SPILLWAY-GATE 10
SERVICE VOLTAGE 120/240 VOLTS — BUS RATING 125 AMPS
A.I.C. 10,000 — NEUTRAL BUS 125 AMPS — FEED FROM 7.5KVA XFMR @ GATE 10

DESCRIPTION	BREAKER POLE	BREAKER AMP	VOLT AMPS A	VOLT AMPS B	CKT NO	BUSS CONN	CKT NO	VOLT AMPS A	VOLT AMPS B	BREAKER POLE	BREAKER AMP	DESCRIPTION
MAIN BREAKER	2	30			1		2			1	20	GATE 10 AMALGAMATOR/ INCLINOMETER CNTL PNL
					3		4			1	20	GATE 11 AMALGAMATOR/ INCLINOMETER CNTL PNL
GATE 8 AMALGAMATOR/ INCLINOMETER CONTROL	1	20			5		6			1	20	GATE 9 AMALGAMATOR/ INCLINOMETER CNTL PNL
SPACE					7		8					SPACE
SPACE					9		10					SPACE
SPACE					11		12					SPACE

CONNECTED BUS A 0 VA — CONNECTED BUS B 0 VA
0 0 — TOTAL: 0 VA
0 0 — DEMAND KVA: 0.0 — DEMAND AMPS: 0.0
NOTE: ** INDICATES ITEMS UNDER THIS CONTRACT
NOTE: * INDICATES GFI BREAKER

FREESE NICHOLS
4055 International Plaza, Suite 200
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Web - www.freese.com

SABINE RIVER AUTHORITY
TOLEDO BEND PROJECT
SPILLWAY ELECTRICAL IMPROVEMENTS
ELECTRICAL
SCHEDULES

F&N JOB NO. SRA19480
DATE MAR 2021
DESIGNED JNH
DRAWN JTR
REVISED
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FILE NAME EL-ALL-SH-LTNG.dwg
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Equipment Submittal

Sabine River Authority

60REOZK – 60 Kilowatt Generator

Account Manager: Jonathan Proctor
(936)577-4535
jproctor@loftinequip.com

Loftin Equipment Company
1241 Universal City Blvd.
Universal City, TX
85008
(210) 881-1623
www.loftinequip.com

KOHLER® POWER SYSTEMS

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

KOHLER. Power Systems

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KOHLER
Power Systems
444 Highland Drive, MS 072, Kohler, WI 53044
Phone: 920-457-4441
Visit us at KohlerPower.com
www.kohlerpower.com

Generator

Kohler Model: 60REOZK

This diesel generator set equipped with a 4P10X alternator operating at 277/480 volts is rated for 60 kW/75 kVA. Output amperage: 90.

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- The generator set engine is certified to meet the Environmental Protection Agency (EPA) emergency stationary emissions requirements.
- Tier 3 EPA-Certified for Stationary Emergency Applications (Not for sale in California)
- A one-year limited warranty covers all generator set systems and components. Two-and five-year extended limited warranties are also available.
- Air Cleaner, Heavy Duty
- Alternator Protection
- Battery Rack and Cables
- Open Crankcase Ventilation

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication. See Controller son page 3.
- The low coolant level shutdown prevents overheating (standard on radiator models only.)
- Integral vibration isolation eliminates the need for under-unit vibration spring isolators.

Alternator Features:

- Oil Drain and Coolant Drain with Hose Barb
- Oil Drain Extension (with narrow skid and enclosures models only)
- Operation and Installation Literature
- Radiator Drain Extension (with enclosure models only)
- Stainless Steel Fasteners on Enclosure (with enclosure models only)
- The unique Fast-Response X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator

KOHLER Power Systems
444 Highland Drive, MS 072, Kohler, WI 53044
Phone: 920-457-4441
Visit us at KohlerPower.com
www.kohlerpower.com

Qty	Description
	60REOZK Generator System
1	60REOZK Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	60REOZK, 12V, 60Hz, KDI3404TM
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	4P10X
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid, 31"
Air Intake	Heavy Duty
Controller	DEC550
Controller Accy, Installed	Controller Connection Kit
Starting Aids, Installed	1000W,110-120V
Cooling System Acc.,Installed	Radiator Duct Flange
Cooling System Acc.,Installed	Radiator Guard
Electrical Accy.,Installed	Battery, 1/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Governor, Electronic
Electrical Accy.,Installed	Failure Relay w/Harness,1Fault
Electrical Accy.,Installed	Generator Heater
Dry Contacts, Installed	10 Relay
Rating, LCB 1	100% Rated
Amps, LCB 1	200
Trip Type, LCB 1	Thermal Magnetic
Interrupt Rating LCB 1	18kA at 480V
Aux Trip, LCB 1	Shunt Trip
LCB Accy. Installed	Shunt Trip Wiring
Fuel Lines, Installed	Flexible Fuel Lines
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset
Miscellaneous Accy,Installed	Oil in Genset
Warranty	2 Year
Testing, Additional	Power Factor Test,0.8,3Ph Only

1	Silencer,Critical,4"NPT,SIEO
1	Flexible Exhaust, 2.5" NPT

KOHLER
Power Systems
444 Highland Drive, MS 072, Kohler, WI 53044
Phone: 920-457-4441
Visit us at KohlerPower.com
www.kohlerpower.com

1	Adapter Bushing, 2.5"NPT - 4"NPT
1	Battery Charger Temp. Comp. Sensor
1	NEC Remote, E-Stop
1	Lit Kit, Production, 60REOZK
1	RSA III, ATS Annunciator
1	Converter, Modbus to Ethernet

KOHLER®

Miscellaneous

Stationary Standby Industrial Generator Set Extended Two-Year or Two Thousand (2000)-Hour Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product	**Warranty Coverage**
Stationary Standby Generator Set & Accessories	Two (2) years from registered startup or two thousand (2000) hours (whichever occurs first).

This warranty is effective only upon Kohler Co.'s receipt of an extended warranty registration form and warranty fee within one year of registered startup. The extended limited warranty start date is determined by the standard limited warranty requirements and runs concurrent with the standard limited warranty during the first year. To receive extended limited warranty coverage, the provisions of the standard limited warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by operation at speeds, or with fuel, loads, conditions, modifications or installation contrary to published specifications.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide the specified type and sufficient quantity of lubricating oil.
   b. Failure to keep the air intake and cooling fin areas clean.
   c. Failure to service the air cleaner.
   d. Failure to provide sufficient coolant and/or cooling air.
   e. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   f. Failure to regularly exercise the generator set under load (stationary applications only).
5. Original installation charges and startup costs.
6. Starting batteries and the following related expenses:
   a. Labor charges related to battery service.
   b. Travel expenses related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year of the warranty period.
8. Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
9. Rental of equipment during the performance of warranty repairs.
10. Removal and replacement of non-Kohler-supplied options and equipment.
11. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
12. Radiators replaced rather than repaired.
13. Fuel injection pumps not repaired by an authorized Kohler service representative.
14. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
15. Engine fluids such as fuel, oil, or coolant/antifreeze.
16. Shop supplies such as adhesives, cleaning solvents, and rags.
17. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
18. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
19. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER®

KOHLER CO., Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

TP-5497 8/16f

KOHLER®

60REOZK

49-State

60 HZ. DIESEL INDUSTRIAL GENERATOR SET

EMISSION DATA SHEET

ENGINE INFORMATION

Model:	KDI3404TM/G18	Bore, mm (in.)	96 (3.28)
Nameplate BHP @ 1800 RPM:	94	Stroke, mm (in.)	116 (4.57)
Type:	4-Cycle, 4 Cyl., Inline	Displacement, L (cu. In.)	3.4 (207)
Aspiration:	Turbocharged		
Compression Ratio:	18.5:1	EPA Family:	NKHXL03.4EST
		EPA Certificate:	NKHXL03.4EST-008

PERFORMANCE DATA:

Engine bkW @ 1800 RPM	70
Fuel Consumption (Lph) @ 100% Load (Standby)	20.4
Exhaust Gas Flow (m^3/min)	14.3
Exhaust Temperature (°C)	490

EXHAUST EMISSION DATA:

	EPA D2 Cycle 5-mode Weighted
NMHC	0.07
CO2	811
NOx (Oxides of Nitrogen as NO_2)	3.99
CO (Carbon Monoxide)	1.1
PM (Particulate Matter)	0.38

Values are in g/kWh unless otherwise noted

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2022 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Kohler Co.**
(U.S. Manufacturer or Importer)

Certificate Number: **NKHXL03.4EST-008**

Effective Date: 09/02/2021

Expiration Date: 12/31/2022

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 09/02/2021

Revision Date: N/A

Model Year: 2022
Manufacturer Type: Original Engine Manufacturer
Engine Family: NKHXL03.4EST

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 56<=kW<75
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

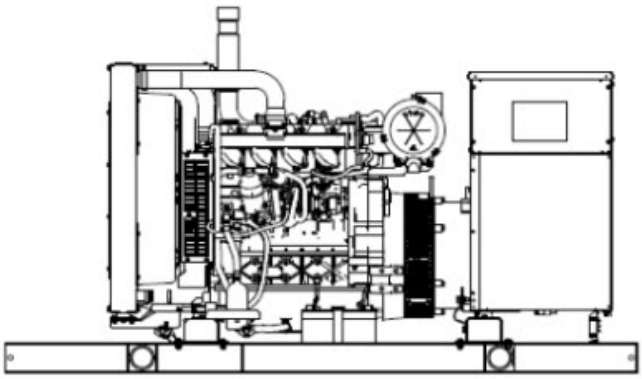
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.

KOHLER®

Spec Sheets



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- The generator set engine is certified to meet the Environmental Protection Agency (EPA) emergency stationary emissions requirements.
- Tier 3 EPA-Certified for Stationary Emergency Applications (Not for sale in California)
- A one-year limited warranty covers all generator set systems and components. Two-and five-year extended limited warranties are also available.
- Air Cleaner, Heavy Duty
- Alternator Protection
- Battery Rack and Cables
- Open Crankcase Ventilation

Alternator Features

- Oil Drain and Coolant Drain with Hose Barb
- Oil Drain Extension (with narrow skid and enclosures models only)
- Operation and Installation Literature
- Radiator Drain Extension (with enclosure models only)
- Stainless Steel Fasteners on Enclosure (with enclosure models only)
- The unique Fast-Response X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication. See Controller son page 3.
- The low coolant level shutdown prevents overheating (standard on radiator models only.)
- Integral vibration isolation eliminates the need for under-unit vibration spring isolators.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
4P10X	277/480	3	60	275	60/75	90

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth Permanent-Magnet
Leads, quantity	12, Reconnectable 4, 110-120/220-240
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, 150°C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Engine

Engine Specification

Engine Manufacturer	Kohler Diesel
Engine Model	KDI 3404TM
Engine: type	4-Cycle, Turbocharged
Cylinder arrangement	4 Inline
Displacement, L (cu. in.)	3.4 (207)
Bore and stroke, mm (in.)	96 x 116 (3.28 x 4.57)
Compression ratio	18.5:1
Piston speed, m/min. (ft./min.)	418 (1371)
Main bearings: quantity, type	5, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	70 (94)
Cylinder head material	Cast Iron
Valve (exhaust) material Intake	Chromium-Silicon Steel
Valve (exhaust) material	Chromium Steel
Governor: type, make/model	Stanadyne/Mechanical
Frequency regulation, no-load to-full load	Droop, 5% (or Isochronous)
Frequency regulation, steady state	±0.5%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: 60REOZK, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	14.3 (505)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	490 (914)
Maximum allowable back pressure, kPa (in. Hg)	6 (1.8)/9 (2.7)
Exh. outlet size at eng. hookup, mm (in.)	63.5 (2.5)

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	12
Battery charging alternator: Ampere rating	90
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	One, 650
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	8.0 (0.31)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, engine-driven fuel pump, m (ft.)	6.0 (20.0)
Max. fuel flow, Lph (gph)	46 (12.2)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel Filter: Prefilter	74 Microns
Fuel Filter Water Separator	5 Microns @ 98% Efficiency
Recommended fuel	#2 Ultra Low Sulfur Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	15.3 (16.2)
Oil pan capacity with filter, L (qt.)	15.6 (16.5)
Oil filter: quantity, type	1, Cartridge
Oil cooler	Water-Cooled

Model: 60REOZK, continued

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	4.5 (1.19)
Radiator system capacity, including engine, L (gal.)	12.3 (3.2)
Engine jacket water flow, Lpm (gpm)	125 (33)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	43 (2447)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	14.3 (814)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	597 (23.5)
Fan, kWm (HP)	1.8 (2.3)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Enclosure with enclosed silencer reduces ambient temperature capability by 5°C (9°F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	130 (4600)
Combustion air, m3/min. (cfm)	5.3 (187)
Heat rejected to ambient air: Engine, kW (Btu/min.)	15.5 (880)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	8.9 (505)
Max. air intake restriction, kPa (in. Hg)	5.2 (1.54)

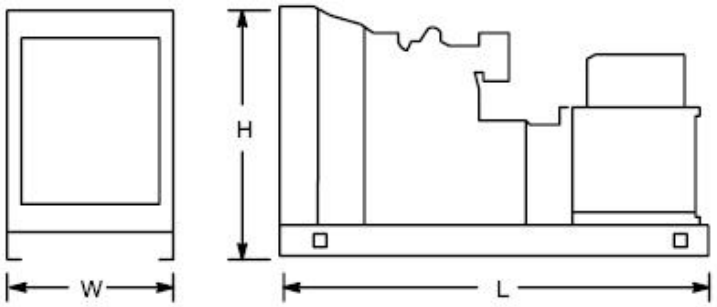
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	20.4 Lph (5.4 gph)
Standby Fuel Consumption at 75% load	16.3 Lph (4.3 gph)
Standby Fuel Consumption at 50% load	10.6 Lph (2.8 gph)
Standby Fuel Consumption at 25% load	6.0 Lph (1.6 gph)
Prime Fuel Consumption at 100% load	18.5 Lph (4.9 gph)
Prime Fuel Consumption at 75% load	14.4 Lph (3.8 gph)
Prime Fuel Consumption at 50% load	9.8 Lph (2.6 gph)
Prime Fuel Consumption at 25% load	5.8 Lph (1.5 gph)

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Overall Size, L x W x H, mm (in.): Wide Skid	2300 x 1040 x 1133 (90.6 x 41.0 x 44.6)
Overall Size, L x W x H, mm (in.): Narrow Skid	1875 x 780 x 1067 (73.8 x 30.7 x 42.0)
Weight (radiator model), wet, kg (lb.):	841 (1855)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 4P10X
Frequency: 60 Hz
Speed: 1800 RPM
Leads: 12 (6 Lead, 600 Volt)

Voltage L-N/L-L	Phase	Power Factor	Connection	kW* (kVA)						
				Class B	Class F				Class H	
				80°C Continuous	90°C Lloyds	95°C ABS	105°C Continuous	130°C Standby	125°C Continuous	150°C Standby
139/240 277/480	3	0.8	Wye	66.0 (82.5)	69.5 (86.5)	71.0 (88.5)	74.5 (93.0)	82.0 (102.5)	80.5 (100.5)	87.5 (109.0)
127/220 254/440	3	0.8	Wye	66.5 (83.0)	69.5 (86.5)	71.5 (89.0)	74.5 (93.0)	81.0 (101.0)	80.0 (100.0)	86.5 (108.0)
120/208 240/416	3	0.8	Wye	65.0 (81.0)	67.5 (84.0)	68.5 (85.5)	71.5 (89.0)	77.5 (96.5)	76.0 (95.0)	82.0 (102.5)
110/190 220/380	3	0.8	Wye	59.0 (73.5)	61.5 (76.5)	62.5 (78.0)	65.0 (81.0)	70.5 (88.0)	69.0 (86.0)	74.5 (93.0)
120/240	3	0.8	Delta	65.0 (81.0)	67.5 (84.0)	68.5 (85.5)	71.5 (89.0)	77.5 (96.5)	76.0 (95.0)	82.0 (102.5)
120/240	1	1.0	Dogleg	53.0 (53.0)	54.5 (54.5)	55.0 (55.0)	58.5 (58.5)	63.0 (63.0)	62.0 (62.0)	66.5 (66.5)
120/240	1	0.8	Dogleg	38.0 (47.5)	40.0 (50.0)	41.0 (51.0)	43.0 (53.5)	46.5 (58.0)	46.0 (57.5)	49.0 (61.0)
347/600	3	0.8	Wye	65.5 (81.5)	69.0 (86.0)	70.5 (88.0)	74.0 (92.5)	81.5 (101.5)	80.0 (100.0)	87.0 (108.5)

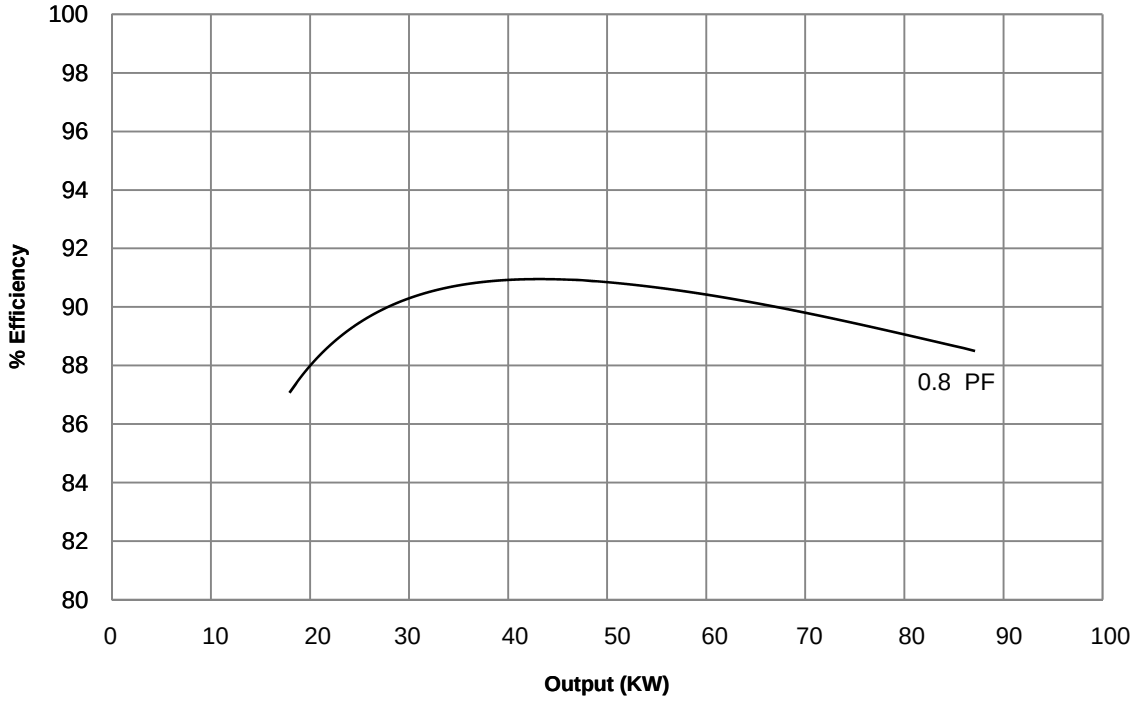
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Submittal Data: 139/240 Volts, 0.8 PF, 1800 RPM, 60 Hz, 3 Phase, 130°C Rise

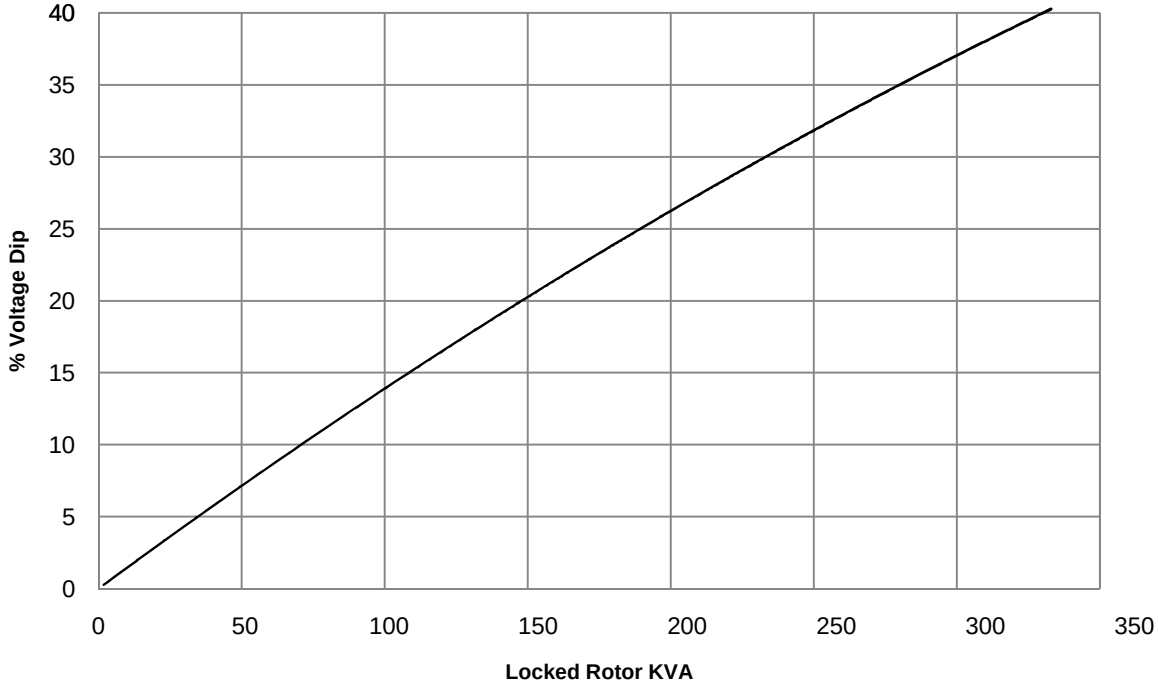
	Symbol	PerUnit	Ohms
Typical Cold Resistances			
Phase Resistance		0.028	0.016
Rotor Resistance		12.75	7.169
Typical Reactances			
Synchronous			
Direct	X_d	3.137	1.763
Quadrature	X_q	1.517	0.853
Transient			
Unsaturated	X'_{du}	0.327	0.184
Saturated	X'_d	0.288	0.162
Subtransient			
Direct	X''_d	0.126	0.071
Quadrature	X''_q	0.118	0.067
Negative Sequence	X_2	0.122	0.069
Zero Sequence	X_0	0.009	0.005

	Symbol	Value
Typical Time Constants		
Armature Short Circuit	T_a	0.009 sec.
Transient Short Circuit	T'_d	0.074 sec.
Transient Open Circuit	T'_{do}	0.809 sec.
Typical Field Current		
Full Load	If_{FL}	15.9 amps
No Load	If_{NL}	4.1 amps
Typical Short Circuit Ratio		0.319
Harmonic Distortion		
RMS Total Harmonic Distortion		2.57%
Max. Single Harmonic		5th
Deviation Factor (No Load, L-L)		<5%
Telephone Influence Factor		<50
Insulation Class		
per NEMA MG1-1.66		H
Phase Rotation		ABC

4P10X, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL ALTERNATOR EFFICIENCY*

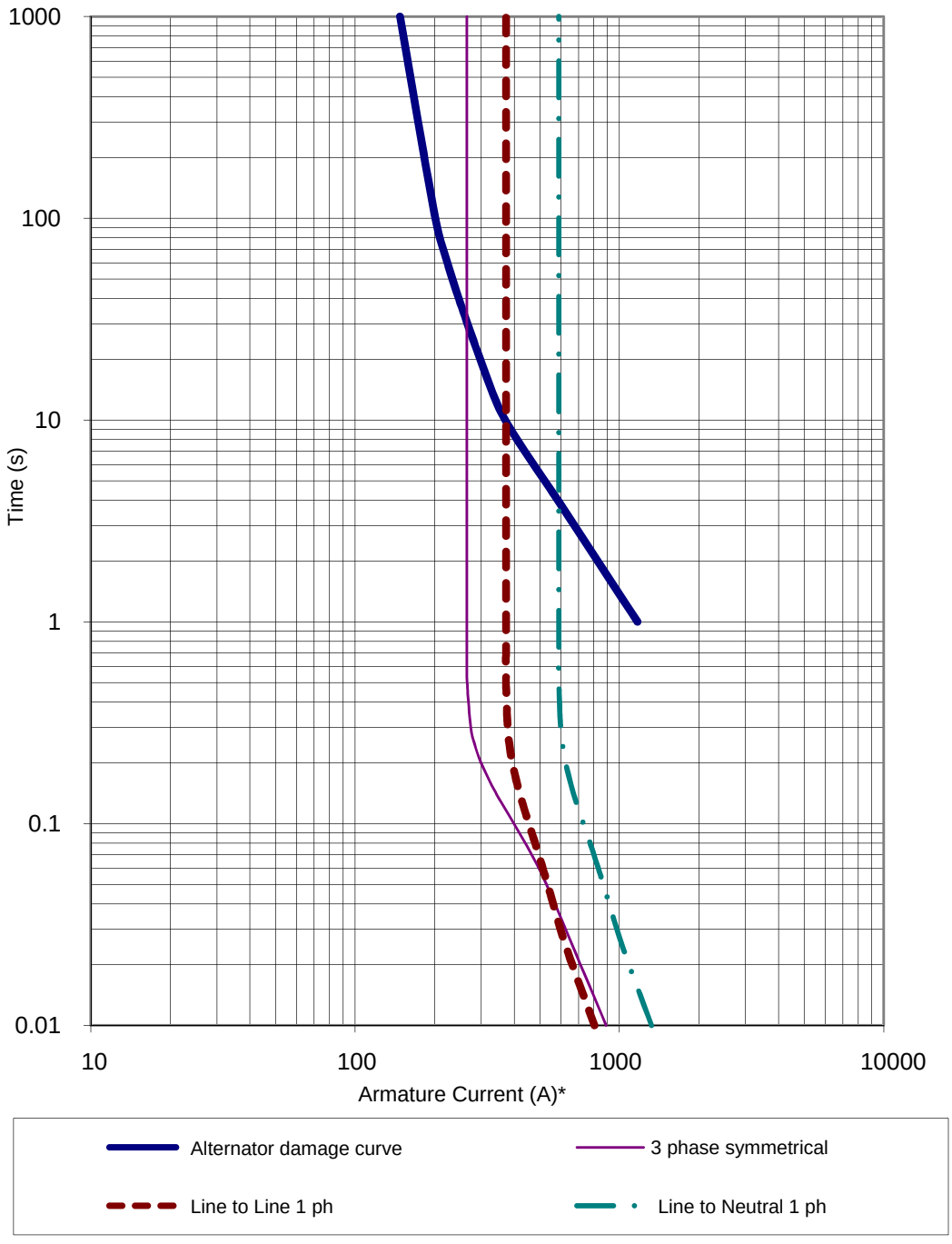


4P10X, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL MOTOR STARTING CHARACTERISTICS*

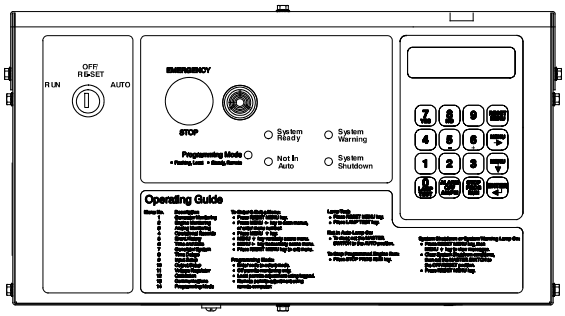


* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

4P10X, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.73 for symmetric.



Decision-Maker® 550

Kohler® Decision-Maker® 550 Controller

General Description and Function

The Decision-Maker® 550 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility with selected engine Electronic Control Modules (ECM).

ECM models only: The Decision-Maker® 550 controller directly communicates with the ECM to monitor engine parameters and diagnose engine problems (see Controller Diagnostics for details).

Standard Features

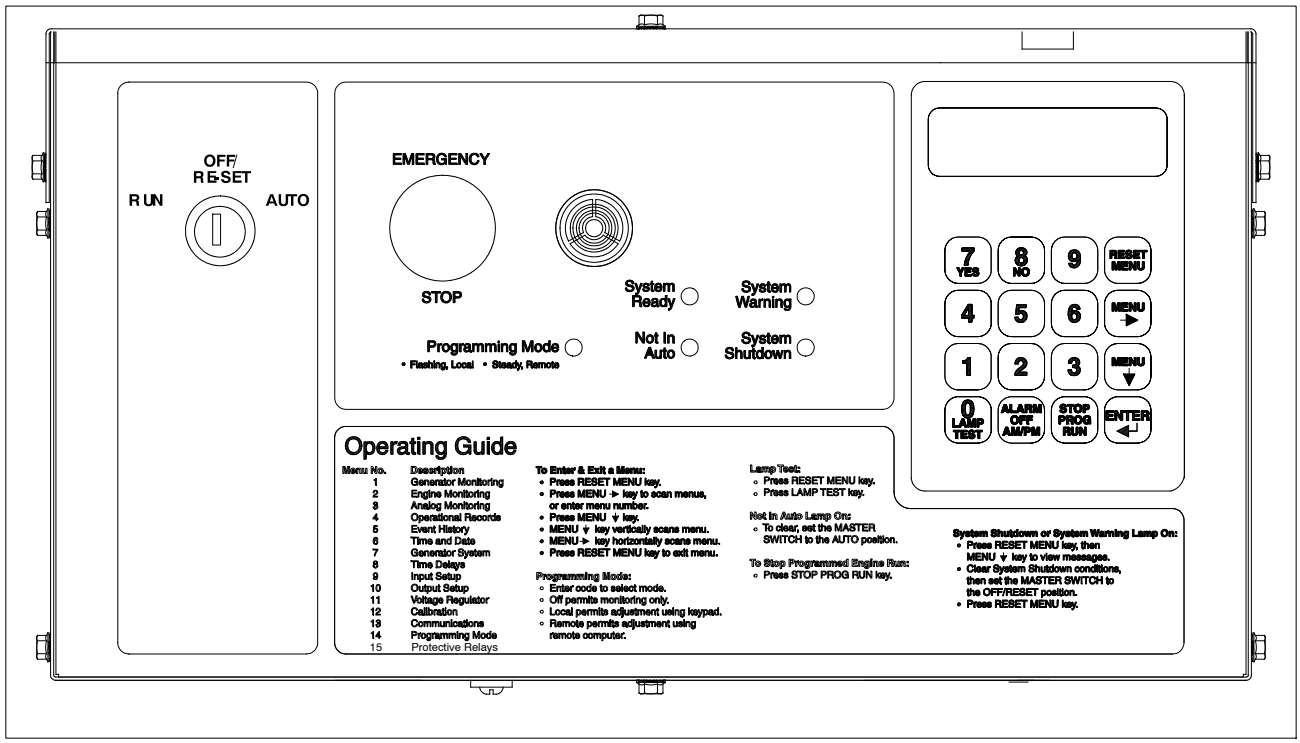
- A digital display and keypad provide access to data. The display provides complete and understandable information, and the keypad allows easy local access.
- Measurements selectable in metric or English units.
- The controller can communicate directly with a personal computer via a network or via a modem configuration.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks. (Ethernet requires an external Modbus®/Ethernet converter module.)
- Integrated voltage regulator providing ±0.25% regulation.
- Built-in alternator thermal overload protection.
- A lockout keyswitch meets appropriate local code requirements.

Optional Features

- Monitor III, an optional menu-driven Windows®-based PC software, monitors engine and alternator parameters and also provides control capability. See G6-76 spec sheet for more information.
- Menu 15 (Protective Relays) is required for optional protective functions and is only available with the Kohler PD-Series switchgear.

Modbus® is a registered trademark of Schneider Electric.

Windows® is a registered trademark of Microsoft Corporation.



Decision-Maker® 550 Controller

Controller Features

Decision-Maker® 550—Software Version 2.70 or higher

Specifications

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 700 milliamps (or 400 milliamps without panel lamps)
- Humidity range: 5% to 95% noncondensing
- Operating temperature range: -40°C to +70°C (-40°F to +158°F)
- Storage temperature range: -40°C to +85°C (-40°F to +185°F)
- Standards:
  - NFPA 99
  - NFPA 110, Level 1
  - CSA 282-09
  - UL 508

Hardware Features

- Vacuum fluorescent display
- Environmentally sealed 16-button membrane keypad
- LED status indicating lights
- Three-position (run, off/reset, auto) keyswitch
- Latch-type emergency stop switch with International Electromechanical Commission (IEC) yellow ring identification
- Alarm horn
- Fuse-protected battery circuits
- Controller mounts locally or remotely up to a distance of 12 m (40 ft.) and viewed from one of four positions
- Dimensions—W x H x D,
  460 x 275 x 291 mm (18.15 x 10.8 x 11.47 in.)

NFPA Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions and faults shown below.

NFPA 110 Common Alarm

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - Overspeed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage *
  - Low battery voltage *
  - Air damper indicator
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence switch
  - Remote emergency stop

* Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.

Controller Functions

The control functions apply to both the ECM and non-ECM equipped models unless noted otherwise.

- **AC Output Voltage Adjustment**
  The voltage adjustment provides keypad adjustment in 0.1 volt increments of the average line-to-line AC output voltage with a maximum adjustment of ±10% of the system voltage.

- **Alternator Protection**
  The controller firmware provides generator set overload and short circuit protection matched to each alternator for the particular voltage/phase configuration.

- **Automatic Restart**
  The controller automatic restart feature initiates the start routine and recrank when the generator set slows to less than 390 rpm after a failed start attempt.

- **Battleswitch (Fault Shutdown Override Switch)**
  The *battleswitch* input provides the ability to override the fault shutdowns except emergency stop and overspeed shutdown in emergency situations and during generator set troubleshooting.

- **Clock and Calendar**
  Real-time clock and calendar functions time stamp shutdowns for local display and remote monitor. Also use these functions to determine the generator set start date and days of operation.

- **Cooldown Temperature Override**
  This feature provides the ability to bypass (override) the cooldown temperature shutdown and force the generator set to run for the full engine cooldown time delay. Also see Time Delay Engine Cooldown (TDEC).

- **Cyclic Cranking**
  The controller has programmable cyclic cranking. The customer selects the number of crank cycles (1- 6) and the crank time from 10 to 30 seconds. The crank disconnect depends upon the speed sensor input information or the generator frequency information. The default cyclic crank setting is 15 seconds on, 15 seconds off for three cycles.

- **Digital Voltage Regulator**
  The digital voltage regulator provides ±0.25% no-load to full-load regulation.

- **Display Power Shutdown**
  To conserve battery power, the display turns off after 5 minutes of inactivity. Pressing any keypad button activates the display.

- **ECM Communication**
  The controller monitors ECM communication links and provides fault detection for oil pressure signal loss, coolant temperature signal loss, and ECM communication loss. Each of these faults provides local display, alarm horn ON, and relay driver output (RDO) on ECM models only. See Controller Diagnostics following for additional information.

- **Idle Speed Function**
  Idle speed function provides the ability to start and run the engine at idle speed for a selectable time period. The engine will go to normal speed should the temperature reach warm-up before the time delay is complete.

- **Lamp Test**
  Keypad switch verifies functionality of the indicator LEDs, alarm horn, and digital display.

- **Load Shed**
  The load shed function provides a load control output (RDO) with user-selectable load shed level.

- **Master Switch Fault**
  The generator set master switch has fault detection at four levels: 1) master switch to off, 2) master switch open, 3) master switch error, and 4) master switch not in auto. Each of these faults/ warnings provides local display, alarm horn on, and activates a relay driver output (RDO). By placing the master switch to the off/reset position, all generator set faults can be reset.

- **Modbus® Interface**
  The Modbus® interface provides industry standard open protocol for communication between the generator set controller and other devices or for network communications.

- **Number of Starts**
  Total number of generator set successful starts is recorded and displayed on the local display and remote PC monitor. This information is a resettable and total record.

- **Programming Access**
  The setup access and programming information is password protected. When locally accessing programming information, the PM (programming mode) LED flashes. When remotely accessing programming information, the PM LED is steady.

- **Programmed Run**
  The programmed run function provides user-selectable time for a one-time exercising of the generator set. The controller does not provide weekly scheduled exercise periods.

- **Remote Reset**
  The remote reset function resets faults and allows restarting of the generator set without going to the master switch off/reset position. The remote reset function is initiated via the remote reset digital input.

- **Running Time Hourmeter**
  The running time hourmeter function is available on the local display and remote monitor. The information displayed uses real time loaded and unloaded run time as an actual and resettable record.

- **Self-Test**
  The controller has memory protection and a microprocessor self-test.

- **Starting Aid**
  The starting aid feature provides control for an ether injection system. This setup has adjustable *on* time before engine crank from 0 to 10 seconds. This feature is also part of the remote communication option.

- **Time Delay Engine Cooldown (TDEC)**
  The TDEC provides a user-selectable time delay before the generator set shuts down. If the engine is *above* the preset temperature and unit is signalled to shut down, unit will continue to run for the duration of the TDEC. If the engine is *at or below* the preset temperature and unit is signalled to shut down or the TDEC is running, unit will shut down without waiting for the time delay to expire. Also see Cooldown Temperature Override.

- **Time Delay Engine Start (TDES)**
  The TDES provides a user-selectable time delay before the generator set starts.

Controller Diagnostics

The controller features warnings and shutdowns as text messages on the vacuum fluorescent display. See the table below.

Warnings show yellow LED and signal an impending problem.
Shutdowns show red LED and stop the generator set.

Note: Menu 15 features are available by purchasing the paralleling switchgear option.

Note: The available user inputs are dependent on factory reserved inputs for specific engine types, engine controls, and paralleling applications.

User-Defined Common Fault and Status. The user customizes outputs through a menu of warnings, shutdowns, and status conditions. User defines up to 31 relay driver outputs **(RDOs)** (relays not included).

	Warning Function	Shutdown Function	User-Defined	User RDOs
Engine Protection				
Air damper control, if equipped			X	X
Air damper indicator, if equipped		X	X	X
Coolant temp. signal loss		X	X	X
High battery voltage	X		X	X
High coolant temperature	X	X	X	X
High oil temp. shutdown		X	X	X
Low battery voltage	X		X	X
Low coolant level		X	X	X
Low coolant temperature	X		X	X
Low fuel level (diesel) *	X		X	X
Low fuel pressure (gas) *	X		X	X
Low oil pressure	X	X	X	X
Oil pressure signal loss		X	X	X
Overcrank		X	X	X
Overspeed		X	X	X
Speed sensor fault	X		X	X
Starting aid			X	X
Weak battery	X		X	X
General Protection				
Auxiliary inputs 0-5 VDC—up to 7 analog	X	X	X	X
Auxiliary inputs—up to 21 digital	X	X	X	X
Battery charger fault *	X		X	X
Defined common fault †			X	X
EEPROM write failure		X	X	X
Emergency stop		X	X	X
Engine cooldown delay			X	X
Engine start delay			X	X
EPS supplying load	X		X	X
Internal fault		X	X	X
Load shed kW overload	X		X	X
Load shed underfrequency	X		X	X
Master switch error		X	X	X
Master switch not in auto	X		X	X
Master switch open		X	X	X
Master switch to off		X	X	X
NFPA 110 common alarm			X	X
SCRDO's 1-4 (software controlled RDOs)			X	X
System ready (status)			X	X
Alternator Protection				
AC sensing loss	X	X	X	X
Critical overvoltage		X	X	X
Generator running			X	X
Ground fault *	X		X	X
Locked rotor		X	X	X
AC Protection (includes Menu 15 Enabled Enhancements)				
Alternator protection (short circuit and overload)		X	X	X
Breaker trip			‡	X
Common protective relay output			X	X
In synchronization			‡	X
Loss of field (reverse VAR)		X	X	X
Overcurrent	X	X	X	X
Overfrequency		X	X	X
Overpower		X	X	X
Overvoltage		X	X	X
Reverse power		X	X	X
Underfrequency		X	X	X
Undervoltage		X	X	X

* Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.

† Factory default settings for the defined common fault are emergency stop, high coolant temperature shutdown, low oil pressure shutdown, overcrank, and overspeed.

‡ Factory set inputs that are fixed and not user changeable.

Controller Displays as Provided by the Engine ECM (availability subject to change by the engine manufacturer)						
Display	**GM/PSI**	**Doosan**	**John Deere (JDEC)**	**Volvo (EMS II)**	**Volvo (EDC III)**	**DD/MTU (ADEC)**
Ambient temperature		X				
Charge air pressure	X	X		X	X	X
Charge air temperature	X	X	X	X	X	
Coolant level				X	X	X
Coolant pressure				X	X	
Coolant temperature	X	X	X	X	X	X
Crankcase pressure				X	X	
ECM battery voltage	X	X				X
ECM fault codes	X	X	X	X	X	X
ECM serial number						X
Engine model number			X			X
Engine serial number			X			X
Engine speed	X	X	X	X	X	X
Fuel pressure				X	X	
Fuel rate	X	X	X	X	X	X
Fuel temperature			X	X	X	X
Oil level					X	
Oil pressure	X	X	X	X	X	X
Oil temperature				X	X	X
Trip fuel				X	X	X

NOTE: 40-60REOZK (Kohler KDI engines) do not include an ECM as standard equipment. REOZMD/ROZMC (Mitsubishi engines) have an ECM but do not send signals to the generator set controller.

Controller Monitoring

Standard Equipment and Features

- Alarm horn
- Indicators:
  - Not in auto (yellow)
  - Program mode (yellow)
  - System ready (green)
  - System shutdown (red)
  - System warning (yellow)
- Switches and standard features:
  - Keypad, 16-button multi-function sealed membrane
  - Lamp test
  - Keyswitch, auto, off/reset, run (engine start)
  - Switch, emergency stop (normally closed contacts)
- Vacuum fluorescent display with two lines of 20 characters

Displays

Some engine displays are dependent upon enhanced electronic engine control availability.

- Engine monitoring data (metric or English units):
  - Battery voltage
  - Engine model number †
  - Engine serial number †
  - Engine speed
  - Engine start countdown
  - ECM—battery voltage †
  - ECM—fault codes
  - ECM—serial number †
  - Fuel rate
  - Level—coolant †
  - Level—oil †
  - Pressure—crankcase †
  - Pressure—charge air †
  - Pressure—coolant †
  - Pressure—fuel
  - Pressure—oil
  - Rpm
  - Temperature—ambient †
  - Temperature—charge air †
  - Temperature—coolant
  - Temperature—fuel †
  - Temperature—oil †
  - Trip fuel †
- Engine setpoints
  - Coolant—high temperature shutdown and warning setpoints
  - Oil—low pressure shutdown and warning setpoints
  - Temperature—engine cooled down setpoint
  - Temperature—engine warmed up setpoint
- Generator monitoring data:
  - Current (L1, L2, L3), ±0.25% accuracy
  - Frequency, ±0.5% accuracy
  - Kilowatts, total per phase (L1, L2, L3), ±0.5% accuracy
  - KVA, total per phase (L1, L2, L3), ±0.5% accuracy
  - KVAR, total absorbing/generating per phase (L1, L2, L3), ±0.5% accuracy
  - Percent alternator duty level (actual load kW/standby kW rating)
  - Power factor per phase, leading/lagging
  - Voltage (line-to-line, line-to-neutral for all phases), ±0.25% accuracy
- Operational records:
  - Event history (stores up to 100 system events)
  - Last start date
  - Number of starts
  - Number of starts since last maintenance
  - Operating days since last maintenance
  - Operating mode—standby or prime power
  - Run time (total, loaded and unloaded hours, and total kW hours)
  - Run time since maintenance (total, loaded, and unloaded hours and total kW hours)
  - System shutdowns
  - System warnings
  - Time, date, and day of week
- Time delays—general:
  - Crank cycles for on/pause
  - Crank cycles for overcrank shutdown
  - Engine cooldown
  - Engine start
  - Load shed
  - Voltage, over- and under-
  - Starting aid
- Time delays—paralleling relays (PR) for optional switchgear applications:
  - Current—over (PR)
  - Current—over shutdown
  - Frequency—over- and under- (PR and shutdown)
  - Loss of field (PR and shutdown)
  - Loss of field shutdown (PR)
  - Power—over (PR)
  - Power—over shutdown
  - Reverse power (PR)
  - Reverse power shutdown
  - Synch matching—frequency, phase, voltage
  - Voltage—over- and under- (PR and shutdown)
- System parameters:
  - Alternator number
  - Current, rated (based on kW, voltage, connection settings)
  - Frequency
  - Generator set model number
  - Generator set serial number
  - Generator set spec number
  - Rating, kW
  - Phase, single and three (wye or delta)
  - Voltage, AC
  - Voltage configuration, wye or delta

Inputs

- Customer and remote inputs:
  - Analog inputs 0- 5 VDC (up to 7 user-defined analog inputs with multiple shutdown and warning levels)
  - Digital contact inputs (up to 21 user-defined digital inputs with shutdown or warning levels)
  - Ground fault detector *
  - Remote emergency stop
  - Remote reset
  - Remote 2-wire start
- Digital inputs (standard):
  - Air damper fault, if equipped
  - Battery charger fault *
  - Battleswitch
  - Emergency stop
  - Field overvoltage (350 kW and higher)
  - High oil temperature
  - Idle mode active (ECM models only) *
  - Low coolant level
  - Low coolant temperature
  - Low fuel warning *
  - Low fuel shutdown *
- Switchgear inputs in Menu 15 (to interface with switchgear system):
  - Circuit breaker closed
  - Enable synch
  - Lockout shutdown
  - Remote reset
  - Remote shutdown
  - VAR/PF mode selection
  - Voltage—raise/lower (or VAR/PF raise/lower in VAR/PF mode)

Outputs

See the Fault Diagnostics section for a breakdown of the available shutdown and warning functions.

- Thirty-one user-defined relay driver outputs (relays not included)
  - Fifteen NFPA 110 faults
  - Defined common faults

Communication

- RS-485 connector for Modbus® RTU communication port
- RS-232 connector for a PC or modem (optional software required)
- SAE J1939 connector for the engine ECM (engine control module)

* Function requires optional input sensors or kits and is engine dependent; see Controller Displays as Provided by the Engine ECM on page 4.

† See Controller Displays as Provided by the Engine ECM on page 4 for display availability.

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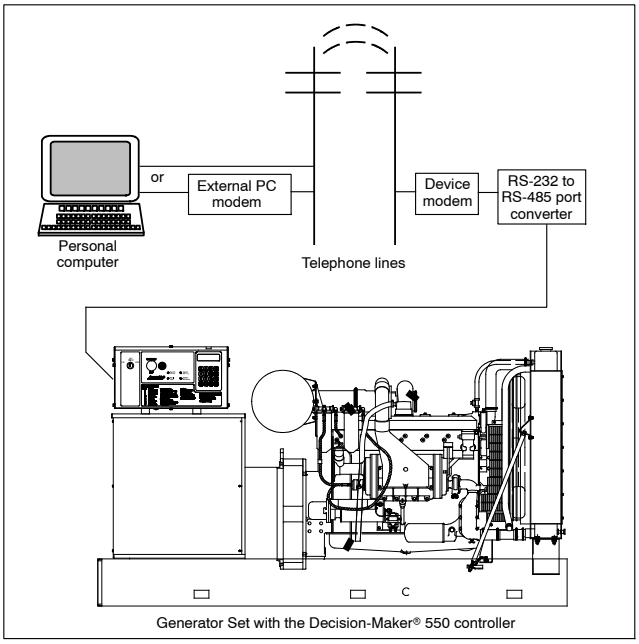
KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Decision-Maker® 550 Controller Available Options

Communication and PC Software Available Options

Refer to spec sheet G6-76, Monitor III Software for additional communication and PC software information including Modbus® communication.

- ❑ **Local Single Connection.** A PC is connected directly to the device communication module with an RS-232 cable for applications where the PC is within 15 m (50 ft.) of the device or RS-485 cable for applications where the PC is up to 1220 m (4000 ft.) from the device.
- ❑ **Local Area Network (LAN).** A PC is connected directly to the device's local area network. A LAN is a system of connecting more than one device to a single PC.
- ❑ **Remote Network (Ethernet):** A PC with a NIC card uses an Ethernet connection to access a remotely located converter (Modbus®/Ethernet) serving a controller. Refer to G6-79 for system details.
- ❑ **Remote Network (Modem):** A PC uses a modem to connect to a remotely located device modem serving a controller. Monitoring software (Monitor III) runs on the PC to view system operation.
- ❑ **Monitor III Software for Monitoring and Control (Windows®-based user interface)**
- ❑ **Converter, Modbus®/Ethernet.** Supports a power system using a controller accessed via the Ethernet. Converter is supplied with an IP address by the site administrator. Refer to G6-79 for converter details.
- ❑ **RS-232 to RS-485 Port Converters**



Generator Set with the Decision-Maker® 550 controller

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

Other Available Options

- ❑ **Common Failure Relay** remotely signals auxiliary fault, emergency stop, high engine temperature, low oil pressure, overcrank, and overspeed via one single-pole, double-throw relay with 10-amp contacts at 120 VAC or 28 VDC maximum.
- ❑ **Run Relay** provides a three-pole, double-throw relay with 10-amp contacts at 120 VAC or 28 VDC maximum for indicating that the generator set is running.
- ❑ **Controller Cable** enables remote mounting of the controller with distances of up to 12 m (40 ft.) from the generator set.
- ❑ **Controller Connection Kit** provides a cable connecting the controller output terminals to a terminal strip in the junction box.
- ❑ **Dry Contact Kit** interfaces between the controller signals and customer-supplied accessories providing contact closure to activate warning devices such as lamps or horns. Kits are available with either one or ten single-pole, double-throw (form-C) relays with 10-amp contacts at 120 VAC or 28 VDC maximum.
- ❑ **Float/Equalize Battery Charger with Alarm Feature** signals controller of battery charger fault.
- ❑ **Prealarm Kit for NFPA 110 (gas fuel models only)** warns the operator of low fuel pressure. Select the kit based on LP vapor or natural gas, combination dual fuel, or LP liquid withdrawal.
- ❑ **Prime Power Switch** prevents battery drain during generator set non-operation periods and when the generator set battery cannot be maintained by an AC battery charger.
- ❑ **Remote Audiovisual Alarm Panel** warns the operator of fault shutdowns and warning conditions. Kit includes common fault lamp and horn with silence switch.
- ❑ **Remote Emergency Stop Panel** immediately shuts the generator set down from a remote station.
- ❑ **Remote Serial Annunciator (RSA) Panel** enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations. Uses Modbus® protocol, an industry standard.

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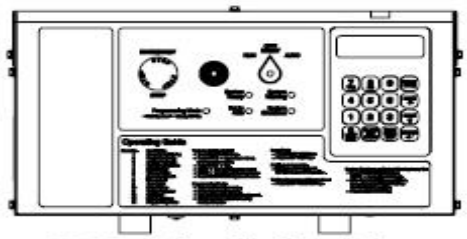
Integral Voltage Regulator with Kohler® Decision-Maker® 550 and Menu-Driven Selections (20-3250 kW Generator Set Models)



550 Controller with Menu-Driven Integral Voltage Regulator

The voltage regulator is integral to the controller and uses microprocessor logic providing ±0.25% no-load to full-load regulation using root-mean-square (RMS) voltage sensing. The voltage regulator features three-phase sensing and is available for 12- or 24-volt engine electrical systems.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with Decision-Maker® 550 Controllers

Calibration	Digital Display	Range Settings	Default Selection
Voltage Adjustment	Volt Adj	±20% of System Voltage	System Voltage
Controller Gain	Regulator Gain	1-1000	100
Underfrequency Unload or Frequency Setpoint	Frequency Setpoint	40 to 70 Hz	1 Hz Below System Frequency (ECM) 2 Hz Below System Frequency (non-ECM)
Underfrequency Unload Scope	Slope	0-10% of Rated Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	Voltage Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	kVAR Adj	-35% to 110%	0 kVAR
PF Adjust Control	PF Adj	0.70 to 1.0 to 0.60	0.8 Lagging
VAR/PF Gain Adjustment	VAR/PF Gain	1-10000	100

KOHLER®

Specification/Feature	Integral with Decision-Maker® 550
Generator Set Availability	350-2250 kW
Type	Microprocessor Based
Status and Shutdown Indicators	LEDs and Text Vacuum Fluorescent Display (VFD) Display
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-240 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	12 VDC @ 100mA max. 5.0 ADC with GM88453 Activator Board
Maximum Output	12 VDC @ 100mA max. 7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.25%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	Less than 5µS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Keypad
Remote Voltage Adjustment	Digital Input Standard/ Analog 0-5 VDC (±10%) Input Optional
Paralleling Capability	Reactive Droop Standard
VAR/PF Control Input	Standard

Integral Voltage Regulator with Decision-Maker® 550 Controller

- A digital display and keypad provide access to data. A two-line vacuum fluorescent display provides complete and concise information.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can communicate with a personal computer directly or on a network. See spec sheets G6-76, Monitor III Software for more information.
- Using optional menu-driven, Windows®-based PC software, an operator can monitor engine and alternator parameters and also provide control capability.
- The controller supports Modbus® RTU (Remote Terminal Unit), an industry standard open communication protocol.
- These controllers can control Fast Response™ II, Fast Response ™X, and wound field alternators using the GM88453 activator board.

Voltage Regulator Menu 11 Displays

- Voltage Adjust
  - Three-phase voltage display
  - Numeric entry of voltage adjust
- Under frequency unload (V/Hz) settingts
  - Enable/disable
  - Cut-in frequency
  - Numeric entry of V/Hz slope
- Reactive Droop settings
  - Enable/disable
  - Numeric entry of droop settings
- VAR control enabled, yes/no
  - Total kVAR (running), kVAR adjustment
  - Generating/absorbing yes/no
- Power factor control enabled yes/no, droop at rated load 0.8 PF
  - Average power factor (running), PF adjustment
  - Lagging/leading, yes/no
- Voltage regulator gain
- Analog voltage regulator adjust enable

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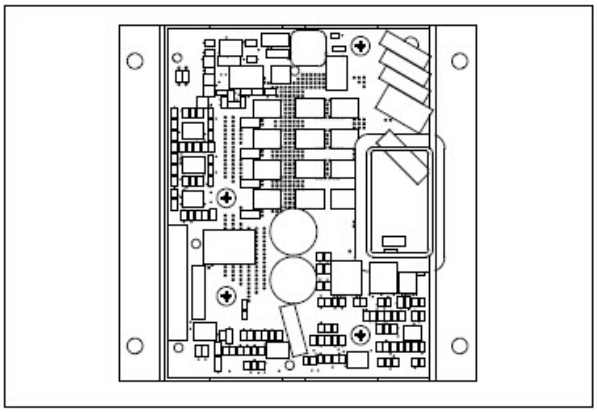
Activator Board GM88453



- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

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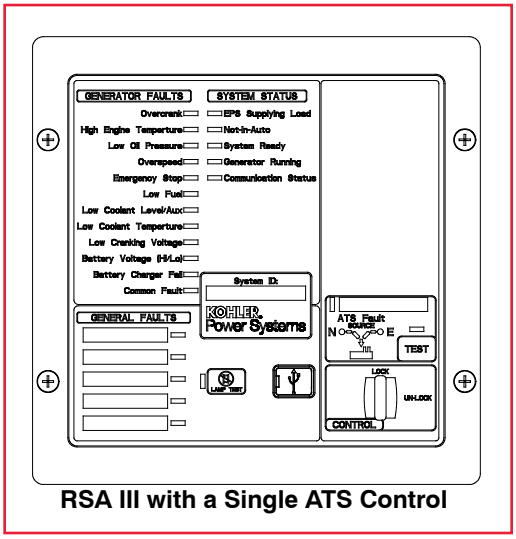

RSA III with a Single ATS Control

Remote Serial Annunciator III (RSA III) for Kohler® Controllers

- Monitors the generator set equipped with one of the following controllers:

APM402	Decision-Maker® 3000
APM603	Decision-Maker® 3500
APM802	Decision-Maker® 6000
Decision-Maker® 3+	Decision-Maker® 8000
Decision-Maker® 550	KPC 1000

- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source for up to four ATS with any of the following controllers:
  - Decision-Maker® MPAC® 750, 1200, and 1500
  - MPAC® 1000 and 1500
- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:
  - RS-485 for serial bus network
  - USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
  - 12-/24-volt DC power supply
  - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

- Dimensions—W x H x D, mm (in.).
  - **Surface Mounted:**
    203 x 203 x 83 (8.0 x 8.0 x 3.3)
  - **Flush Mounted (Inside Wall):**
    203 x 203 x 76 (8.0 x 8.0 x 3.0)
    Flush mounting plate W1: 254 (10.0)

* SiteTech™ software is available to Kohler authorized distributors and dealers.

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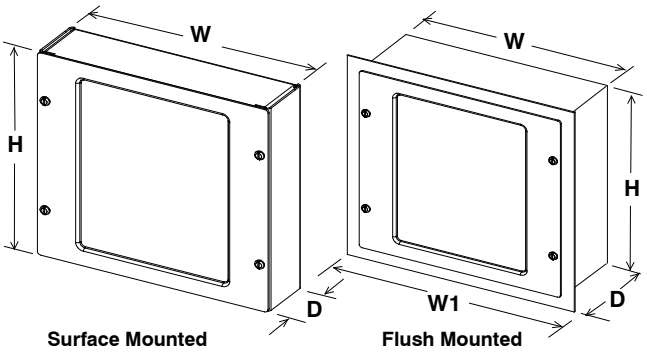

Surface Mounted **Flush Mounted**

G6-139 4/19c

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
User Input #4 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #4 (Shutdown) (1)	Red	On	Green	Off	Green
User Input #5 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #5 (Shutdown) (1)	Red	On	Green	Off	Green
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA III with ATS Controls only)	Red	On	Red or Yellow	Green or Off	Green

Green LEDs appear as steady on when activated.
Yellow LEDs slow flash when activated except steady on with EPS supplying load and high battery voltage.
Red LEDs slow flash when activated except fast flash with loss of communication and not-in-auto.

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.
(2) Decision-Maker® 3+ controller only.
* May require optional kit or user-provided device to enable function and LED indication.
† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.
Modbus® is a registered trademark of Schneider Electric.

ATS Controls (RSA III with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated lock/unlock switch for Test feature
- Test pushbutton

NFPA Requirements

- NFPA 110 compliant
- Engine functions:
  - High battery voltage warning *
  - High engine temperature shutdown
  - High engine temperature warning *
  - Low battery voltage warning *
  - Low coolant level/aux. shutdown
  - Low coolant temperature warning *
  - Low cranking voltage
  - Low fuel warning (level or pressure) *
  - Low oil pressure shutdown
  - Low oil pressure warning *
  - Overcrank shutdown
  - Overspeed shutdown
- General functions:
  - Audible alarm silence
  - Battery charger fault *
  - Lamp test
  - Master switch not-in-auto

Fault and Status LEDs and Lamp Test Switch

Alarm Horn. Horn sounds giving a minimum 90 dB at 0.1 m (0.3 ft.) audible alarm when a warning or shutdown fault condition exists except on high/low battery voltage or EPS supplying load.

Alarm Silenced. Red LED on lamp test switch lights when alarm horn is deactivated by alarm silence switch.

Alarm Silence Switch. Lamp test switch quiets the alarm during servicing. The horn will reactivate upon additional faults.

ATS Fault. Red LED lights when ATS fails to transfer.

Battery Charger Fail. LED lights if battery charger malfunctions. Requires battery charger with alarm contact.

Battery Voltage Hi/Lo. LED flashes if battery or charging voltage drops below preset level. LED lights steady if battery voltage exceeds preset level.

Common Fault. LED lights when a single or multiple common faults occur.

Communication Status. Green LED lights indicating annunciator communications functional. Red LED indicates communication fault.

EPS Supplying Load. LED lights when the Emergency Power System (EPS) generator set is supplying the load (APM402, APM603, APM802, and Decision-Maker® 550, 3000, 3500, 6000, and 8000 controllers) or when transfer switch is in the emergency position (Decision-Maker® 3+ controller).

Emergency Stop. LED lights and engine stops when emergency stop is made. May require a local emergency stop switch on some Decision-Maker® 3+ controllers.

Generator Running. LED lights when generator set is in operation.

High Engine Temperature. Red LED lights if engine has shut down because of high engine coolant temperature. Yellow LED lights if engine coolant temperature approaches shutdown range. Requires warning sender on some models.

Lamp Test (Switch). Switch tests all the annunciator indicator LEDs and horn.

Low Coolant Level/Aux. LED lights when engine coolant level is below acceptable range on radiator-mounted generator sets only. When used with a Decision-Maker® 3+ controller, the LED indicates low coolant level or an auxiliary fault shutdown. Requires user-supplied low coolant level switch on remote radiator models.

Low Coolant Temperature. LED lights if optional engine block heater malfunctions and/or engine coolant temperature is too low. Requires prealarm sender on some models.

Low Cranking Voltage. LED lights if battery voltage drops below preset level during engine cranking.

Low Fuel (Level or Pressure). LED lights if fuel level in tank approaches empty with diesel models or fuel pressure is low on gas models. Requires customer-supplied switch.

Low Oil Pressure. Red LED lights if generator set shuts down because of insufficient oil pressure. Yellow LED lights if engine oil pressure approaches shutdown range. Requires warning sender on some models.

Not In Auto. LED lights when the generator set controller is not set to automatic mode.

Overcrank. LED lights and cranking stops if engine does not start in either continuous cranking or cyclic cranking modes.

Overspeed. LED lights if generator set shuts down because of overspeed condition.

System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1-#5. Monitors five digital auxiliary inputs (can be configured as warnings or shutdowns). User-defined digital inputs are selected via the RSA III master for local or remote (generator set or ATS). The user-defined digital input can be assigned via PC using SiteTech™ setup software.

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Accessories

- ❑ Power source adapter kit 120/208 VAC, 50/60 Hz.
- ❑ Modbus®/Ethernet converter GM41143-KP2 for serial to Ethernet communication.
- ❑ Communication module GM32644-KA1 or GM32644-KP1 is required with Decision-Maker® 3+ controllers.

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Applicable to the Following Kohler® Controllers:

Generator Set Controllers:

APM402	Decision-Maker® 3000
APM802†	Decision-Maker® 3500
Decision-Maker® 3+	Decision-Maker® 6000
Decision-Maker® 340*	Decision-Maker® 8000†‡
Decision-Maker® 550	

Automatic Transfer Switch Controllers:

M340/M340+*	MPAC™ 1500§
MPAC™ 1000	Decision-Maker® MPAC750/1200/1500§

RSA II and RSA III Remote Serial Annunciators

RSA 1000 (Remote Serial Annunciator) version 2.00 or higher

PM340 Power Monitor *

* Series 340 devices also require Modbus®/KBUS converter kit GM41143-KP3.

† APM802 and Decision-Maker® 8000 controllers can connect directly to the Ethernet.

‡ Converter is required to connect Decision-Maker® 8000 controller to RSA III over the Ethernet.

§ MPAC 1500 and DM MPAC 1500 controllers can connect directly to the Ethernet. The converter is required for SNMP only. DM MPAC 750 and 1200 controllers with the optional Ethernet board can connect directly to the Ethernet.

Standard Features and Functions

- Converts Modbus® RTU protocol to Modbus® TCP/IP for communication via an Ethernet network
- A single converter can support one or more controllers in an RS-485 network
- Software (included) programs IP address and configures communication parameters
- LEDs indicate status:
  - Power
  - Data received
  - Data transmitted
- NEMA type 1 enclosure
- Standard RJ45 jack for Ethernet connection
- Terminal block for RS-485 Modbus® connection
- Baud rate:
  - Selectable 9600 or 19200 on Modbus® RTU side
  - Standard 10/100 Ethernet
- 12 VDC power required:
  - Universal AC power adapter included
  - Can be powered through the generator set battery
- FCC Class A compliant
- Converter allows connection of RSA 1000 (version 2.00 and higher), RSA II, or RSA III master and slave devices to an Ethernet network
- Converter allows Simple Network Management Protocol (SNMP) users to poll or issue trap commands for the controllers listed on page 2.

Ethernet Networks

Many facilities use Ethernet networks to connect computers and equipment. The Modbus®/Ethernet converter can be used to connect a single power system device* or network of devices to an existing Ethernet network. Any remote PC connected to that Ethernet network can then monitor the device(s).

A single converter can provide an Ethernet connection to an RS-485 network. See Figure 1. Multiple devices are connected together using RS-485 connections and connected to the Ethernet network through the Modbus®/Ethernet converter. The converter is assigned a unique IP address to identify the connected device or network of devices.

The PC can be located anywhere the site's Ethernet network can be accessed. The PC used to monitor the device(s) must be equipped with a network interface card (NIC). Setting up the Ethernet network and connected computers is the responsibility of the user.

Alternatively, multiple converters can be used to connect individual devices or multiple device networks to the Ethernet. See Figure 2.

Modbus®/Ethernet converters can be used to allow the RSA 1000, RSAII, or RSA III Remote Serial Annunciators to monitor generator set controllers over an Ethernet network. Use one converter to connect the RSA to the Ethernet network, and a second converter to connect the controller to the Ethernet network The converter can also be used to connect RSA slave devices through the Ethernet network.

SNMP Support

Simple Network Management Protocol is used by some network management systems to monitor and/or control managed devices. The Modbus®/Ethernet converter is a managed device that supports SNMP trap commands. This results in reporting faults and events communicated by the following controllers:

- APM402/Decision-Maker® 3000 generator set controller
- Decision-Maker® 3+ generator set controller
- Decision-Maker® 550 generator set controller
- Decision-Maker® 6000 generator set controller
- MPAC™ 1000 ATS controller
- MPAC™ 1500 ATS controller
- Decision-Maker® MPAC1500 ATS controller

The network management system can then manage and send this data to an e-mail address or a phone number to alert selected personnel that action may be required.

DeviceInstaller Software

DeviceInstaller software is provided with the Modbus®/Ethernet converter kit. Use the software to set the converter's IP address and baud rate at installation. The program also allows configuration of the converter for an RSA 1000 master or slave. Complete instructions are provided with the converter kit.

Converter Specifications

Environmental Specifications	
Operating Temperature:	
Converter module	-40° to 70° C (-40° to 158° F)
Optional AC adapter	0° to 40° C (32° to 104° F)
Storage temperature:	
Converter module	-40° to 85° C (-40° to 185° F)
Optional AC adapter	-20° to 85° C (-4° to 185° F)
Humidity	5% to 95% non-condensing

Application Data	
Connections:	
Modbus RTU	Terminal block †
Ethernet	Standard RJ45 jack ‡
Power:	
Supply voltage	10-30 VDC or 120 VAC §
Maximum power draw	2 W

† Belden #9841 or equivalent shielded twisted-pair cable recommended, not supplied.

‡ Mating connector and cable not supplied

§ Universal AC adapter provided.

Dimensions and Weight			
Dimensions mm (in.)	L *	W	H
	111.1 (4.4)	78.8 (3.1)	31.8 (1.25)
Weight kg (lb.)	0.45 (1 lb.)		

* Length includes 13 mm (1/2 in.) mounting tabs

* A device is any of the generator set controllers, transfer switch controllers, or monitoring devices listed on the first page of this document.

Ethernet Connections

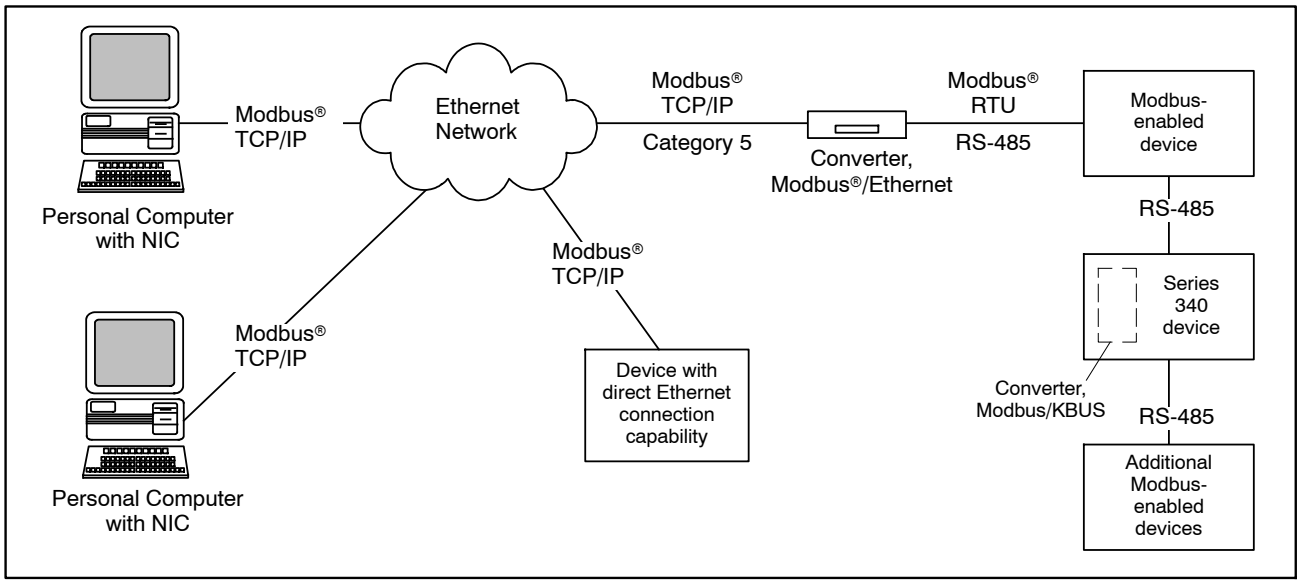

Figure 1 Single Converter Connected to an RS-485 Network

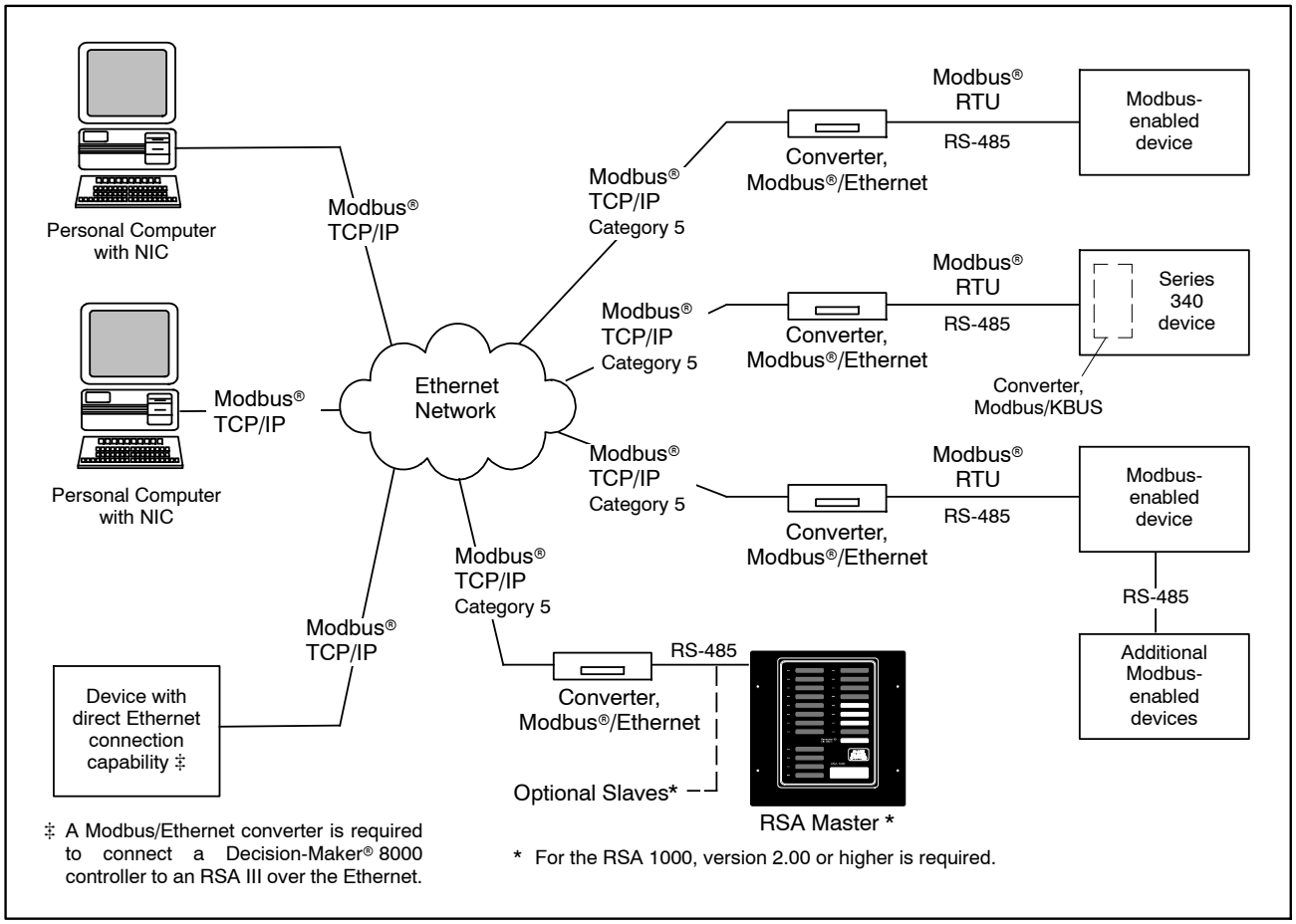

Figure 2 Multiple Converters

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Communication Products and Accessories

- ❑ Modbus®/Ethernet converter kits (GM41143-KP2)
- ❑ Ethernet board for Decision-Maker® MPAC 750 and 1200 controllers (GM89855-KP1)
- ❑ Modbus®/KBUS converter kits for the following devices (required for Modbus® communication) (GM41143-KP3):
  - ❑ Decision-Maker® 340 generator set controller
  - ❑ M340 and M340+ transfer switch controller
  - ❑ PM340 power monitor
- ❑ Modbus® communication board for Decision-Maker® 3+ generator set controllers (required for Modbus® communication) (GM32644-KA1/KP1)
- ❑ RS-232/RS-485 port converter (GM41143-KP1)
- ❑ Monitor III software kit with hardware key (GM41141-KP1)
- ❑ Monitor III software kit with hardware key and 60 Hz device modem (GM41141-KP2)

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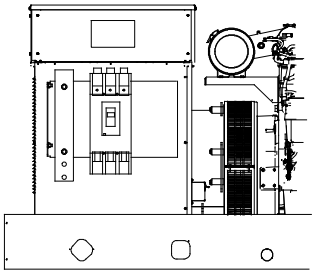


Single Circuit Breaker Kit with Neutral Bus Bar 15- 300 kW Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
  - Magnetic trip
  - Thermal magnetic trip
  - Electronic trip
  - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350- 2500 kW models and selected 80- 300 kW models).
- Up to four line circuit breakers can be used on 350- 2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
  - UL 489 Molded Case Circuit Breakers
  - UL 1077 Supplementary Protectors
  - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory- calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

❑ Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

❑ Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.
15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

❑ Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

❑ Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

❑ Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

❑ Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

❑ Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

❑ Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

15- 300* kW Line Circuit Breaker Specifications

* Includes models 300REOZJ and 300REZXC. For other 300 kW models, see the 300- 2250 kW section.

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4D/4E	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
4P/4PX 4Q/4QX	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	JD
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
4RX 4S/4SX 4TX 4V 4UA 4M6226	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 800	Electronic LSI	PG
		Electronic LSIG	
4UA 4M6226	1000- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers with the Decision-Maker® 6000 Controller/DPS System or APM603 controller.

Generator-Mounted P-Frame, 24VDC Electrically Operated			
Alt. Model	**Amps**	**Trip Unit**	**Frame**
4RX 4S/4SX 4TX 4V	250 400 600 800	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
4UA 4M6226	250 400 600 800 1000 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, 2 type C auxiliary contacts, and 1 type C SDE overcurrent switch contact. No second breakers are allowed in combination with these breakers.			

Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
PG	65	35	18
PJ	100	65	25
PL	125	100	25

Circuit Breaker Lugs Per Phase (Al/Cu)

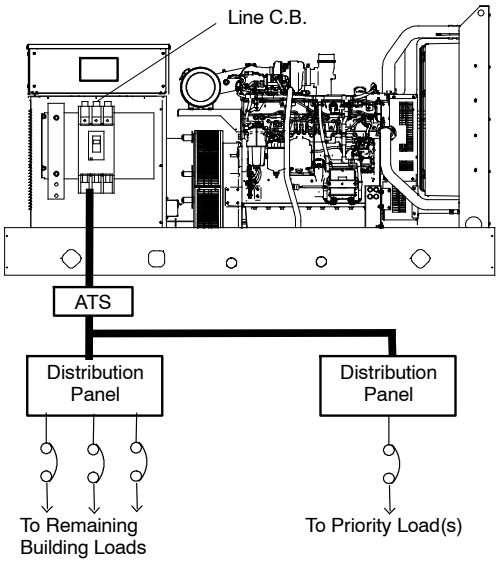
Frame Size	Ampere Range	Wire Range
E (480 V max.)	30- 100	Up to two wire terminals fitting 10-32 or 1/4-20 stud
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil AL/CU
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
Mechanical Load Lugs Included with H, J, and LG LSIG Neutrals		
H	60- 150	One #14 to 3/0 AL/CU
J	250	One 3/0 to 350 kcmil AL/CU
LG	400- 600	Two 4/0 to 500 kcmil AL/CU

15- 300* kW Line Circuit Breaker Applications

* Includes models 300REOZJ and 300REZXC. For other 300 kW models, see the 300- 2250 kW section.

Single Circuit Breaker Installations

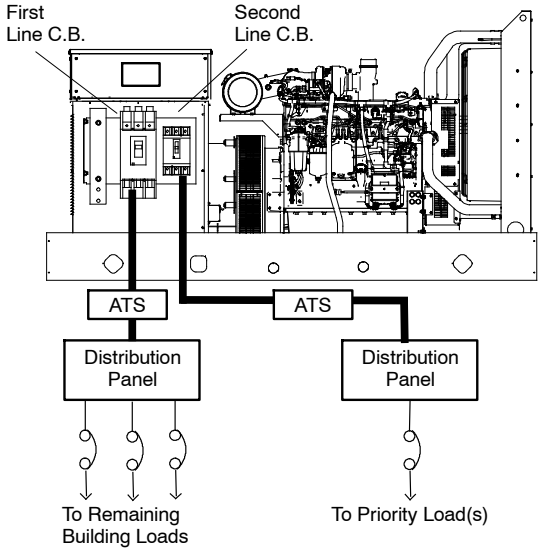
A generator set with a single circuit breaker installed typically feeds a single transfer switch and then a distribution panel. This allows protection of the entire system.



Single line circuit breaker configuration where circuit breaker can trip causing all power to building loads including priority load to be disrupted.

Multiple Circuit Breaker Installations

A generator set with dual circuit breakers installed is used to separate critical loads. Typically, one circuit breaker will feed a main transfer switch with noncritical loads and the other circuit breaker will feed a second transfer switch that feeds critical or priority loads. Multiple circuit breakers allow circuit protection for special applications.



Dual line circuit breaker configuration where first circuit breaker can trip allowing second circuit breaker to continue supplying power to priority load(s).

Circuit Breaker Combinations

Alternator Model	First C. B. Frame	Second C. B. Frame	Third C. B. Frame	Trip Type
ALL except 4D/4E	H	—	—	All
	J	—	—	
	LA	—	—	
	LG	—	—	
4D/4E	H	—	—	Standard or LSIG
	H	H	—	No LSIG
4P/4PX 4Q/4QX	H	H or J	—	No LSIG
	J		—	
	LA		—	
	LG	H, J or LG	—	
4RX 4S/4SX 4TX 4V	M	—	—	All
	P	—	—	All
	H or J	H or J	—	No LSIG
	LA	H, J, or LA	—	
	LG	H, J, LA, or LG	—	
	M			
	P			
	H or J	H or J	H or J	
4UA 4M6226	M or P	—	—	All
	H or J	H or J	—	All
	LA	H, J, or LA	—	
	LG	H, J, LA, or LG	—	
	M or P	H, J, LA, or LG	—	
	P	P	—	No LSIG
	H or J	H or J	H or J	
	LA	H or J	H or J	
		LA	H, J, or LA	
	LG	H or J	H or J	
		LA	H, J, or LA	
		LG	H, J, LA, or LG	
	M or P	H or J	H or J	
		LA	H, J, or LA	
		LG	H, J, or LG	

Powerpact® H- and J-Frame 15A to 250A Molded Case Circuit Breakers

HD and HG 2-Pole

H-Frame 150A

J-Frame 250A

Delivering unmatched application flexibility

Well-suited to a wide range of applications, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature a full complement of field installable accessories, field installable trip units and improved interrupting ratings. These Molded Case Circuit Breakers deliver unmatched design flexibility for 15A to 250A applications and share identical mounting holes, handle locations, trim dimensions and accessories, allowing customers to standardize equipment designs for 15A to 250A applications.

Full-Featured Performance

- H-Frame – 150A available in both standard and 100% ratings with standard amperage ratings from 15 to 150A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA and L-100kA at 480VAC
- J-Frame – 250A available in both standard and 100% ratings with standard amperage ratings from 150A to 250A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA, and L-100kA at 480VAC
- Field installable accessories are common for H- and J-Frame Circuit Breakers to make stocking and installation easy
- Unique snap-in terminals make converting bus bar and lug configurations simple and easy
- Field-installable trip units lower inventory costs and reduce stocking space by configuring products at point of use
- Allows design standardization for 15A to 250A applications with common mounting holes, handle locations, and trim dimensions for both H- and J-Frame Circuit Breakers
- Many configuration options provide application flexibility, with I-Line®, plug-in, drawout, rear connected, distribution lug, crimp lug and din-rail configurations
- Motor operators, rotary handles and cable operators provide options for integrating into a variety of applications
- Certified to global standards, including UL, IEC, CSA and NOM

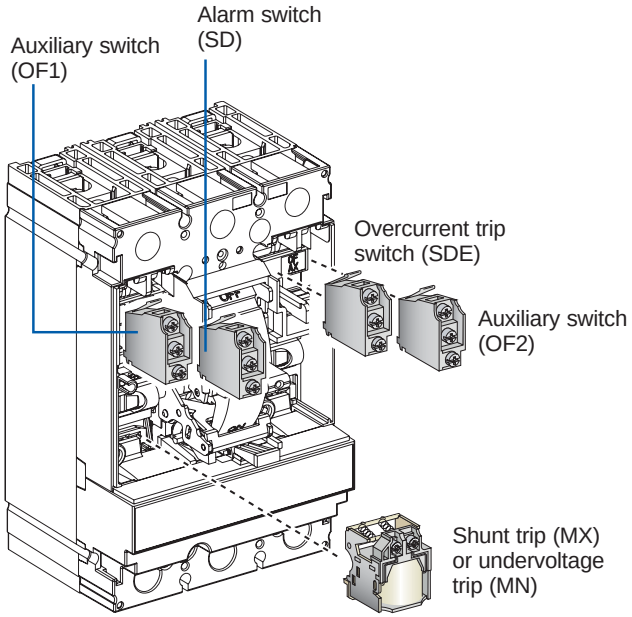
H-Frame **J-Frame** **H-Frame** **J-Frame**

Standardize Designs

Designed to help simplify the design process, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature common mounting holes, handle locations and trim dimensions.

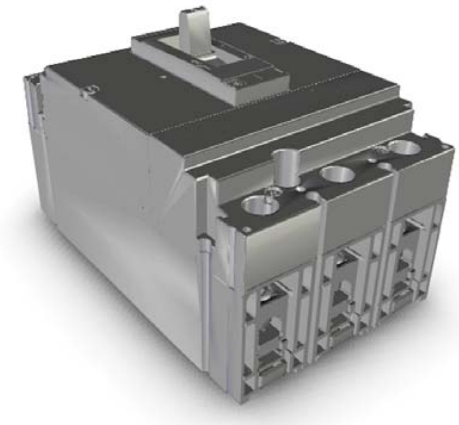
Consolidate Inventory

Reduce inventory costs with the Powerpact H- and J-Frame Molded Case Circuit Breakers. These circuit breakers are designed to work with common components like operating handles, auxiliary switches, shunt trips and many other accessories. They also offer savings in the form of rationalized mounting pans, door trims and enclosures.



Simplify Installation

Field-installable accessories provide flexibility for late specification changes or installation at point of use. Auxiliary switches, shunt trip and undervoltage release are easy to install, reliable and common to many Powerpact Circuit Breakers.



Streamline Design Integration

Comprehensive technical literature, CAD drawings and 3D models are available online to support the Powerpact H- and J-Frame Circuit Breaker line. In addition, 3D models can be downloaded in most CAD formats.

Easy to Convert

Unique snap-in lugs make converting between bus bar and lug options simple and easy. Whether the application calls for lugs on the line side, load side or both, conversions are simple, making the Powerpact H- and J-Frame Molded Case Circuit Breakers ideal for applications that require configuring products at the point of use. The terminal nut or mechanical lug is set on a plastic retainer that slides and snaps into place, without the use of tools.

Bus Bar Option

Lug Option

Multiple Configurations

Cradle

Plug-in Base

I-Line

Rear Connected

Ordering Flexibility for Various Applications

- **Purchase Standard Circuit Breaker**
  Features fixed trip unit capable of reverse connection.
- **Circuit Breaker and Separate Trip Units***
  Save valuable inventory costs by configuring products at point of use. Only three frame sizes are needed to cover the entire range from 15A to 250A (shown below with H-Frame Circuit Breaker).
- **Purchase the Complete Circuit Breaker with Field-Interchangeable Trip Unit***
  Respond to last minute specification changes with the flexibility of a field interchangeable trip unit.

**Marked line and load and not suitable for reverse connection*

Contact your Square D sales representative for additional information. Or, visit www.us.SquareD.com.

Schneider Electric - North American Operating Division
1415 S. Roselle Road
Palatine, IL 60067
Tel: 847-397-2600
Fax: 847-925-7500

Order Number 0611HO0401
03-04

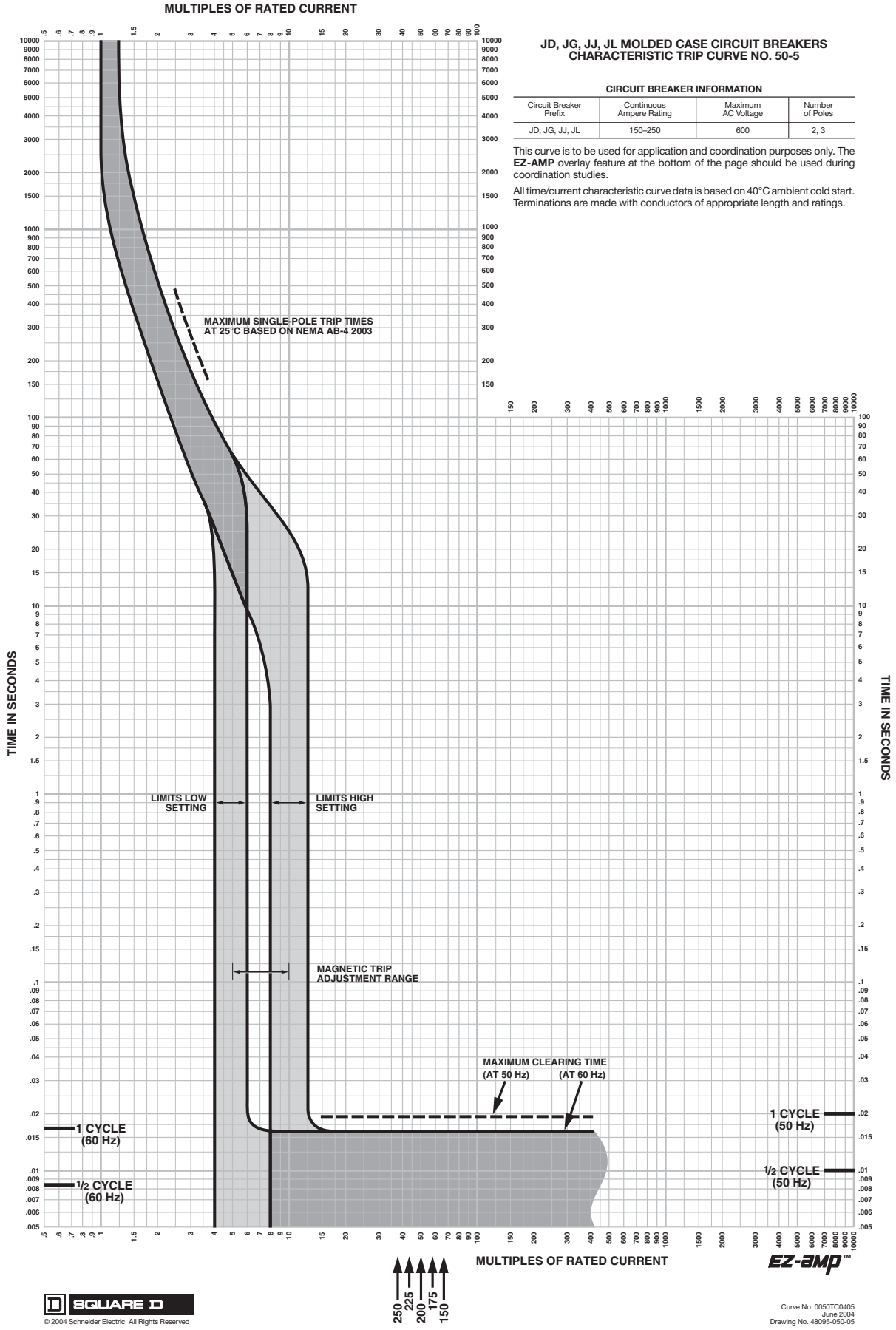
JD, JG, JJ, JL MOLDED CASE CIRCUIT BREAKERS
CHARACTERISTIC TRIP CURVE NO. 50-5

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
JD, JG, JJ, JL	150–250	600	2, 3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.

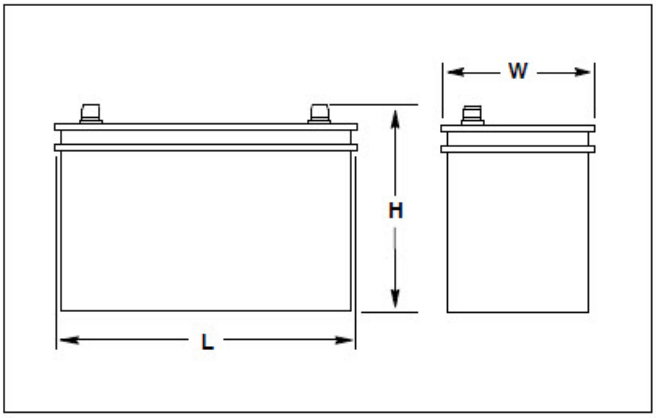


Curve No. 0050TC0405
June 2004
Drawing No. 48095-050-05

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

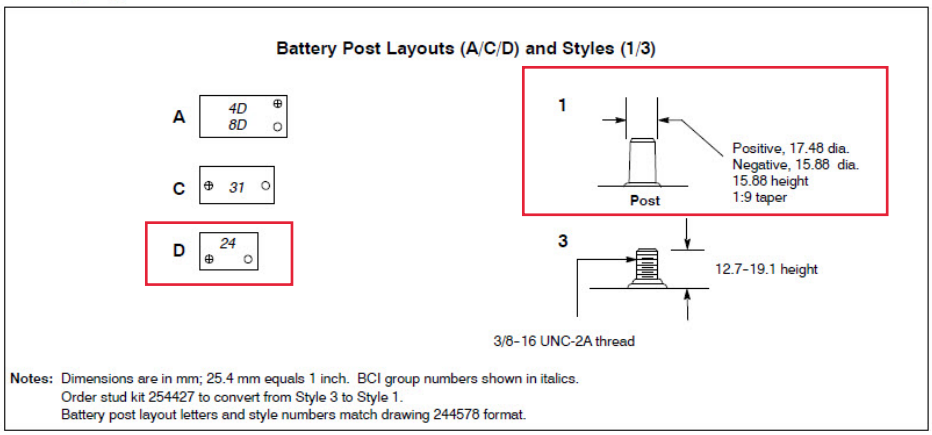


Standard Features

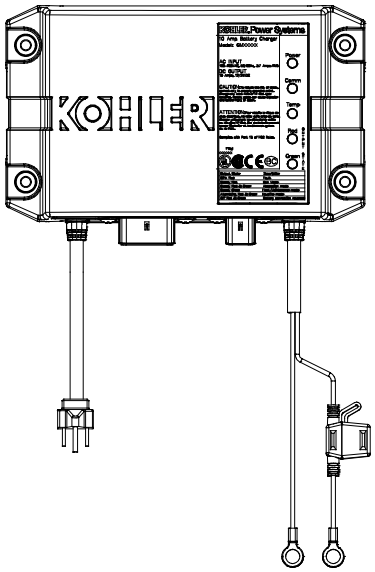
- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0°C (32°F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18ºC (0ºF) Min.	Reserve Capacity Minutes at 27º (80ºF) Min.	Battery Post Layout and Style
				L	W	H			
Wet	256984	1	24	273.0 (10.8)	173.0 (6.8)	228.6 (9.0)	650	130	D/1

Battery Specifications



12/24 Volt, 10 Amp
Automatic Multi-Stage Battery Charger



The battery charger is a fully-automatic, high efficiency battery charger that charges batteries rapidly and safely. The battery charger is designed for an industrial environment.

The battery charger is designed for operation with an engine cranking battery.

The battery charger is universal voltage input capable, comes with a standard 120 V/60 Hz AC plug, and charges 12 VDC or 24 VDC battery systems.

Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

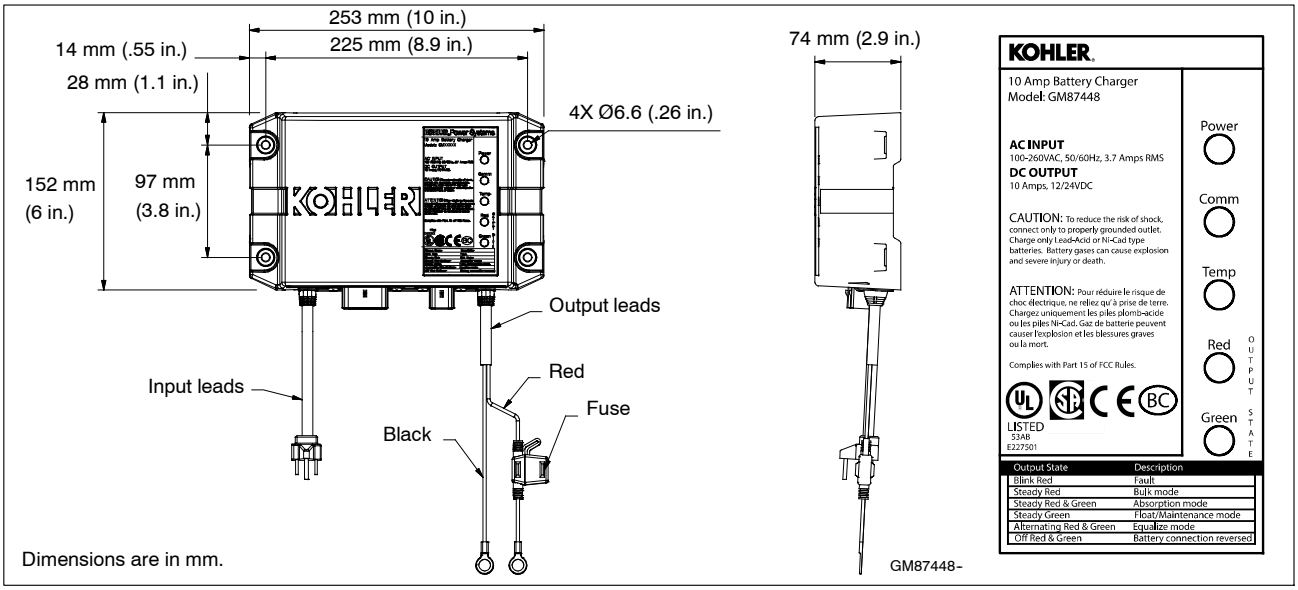
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

Standard Features

- 12 or 24 VDC output
  - Automatic voltage detection
- Automatic multi-stage charging modes
  - Recovery charge
  - Bulk charge
  - Absorption charge
  - Float charge
  - Equalize charge
- Charges the following type batteries:
  - Flooded lead acid (FLA)
  - AGM
  - Gel cell
  - High performance AGM
  - Nickel-cadmium (NiCad)
- 5 LED status indicators
- Durable potted assembly for waterproofing and vibration resistance
- Reverse-polarity protection
- Short-circuit protection
- Electronically limited output current
- Optional temperature compensation (FLA only)
- User adjustable parameters to support optimal manufacturer recommended charge curve.
- Code compliance:
  - UL 1236 Listed
  - NFPA 110, Level 1 compatible (when used with Kohler controller and connected to engine harness)
  - CSA - C22.2 No. 107.2-01
  - FCC - Title 47, Part 15 Class A
  - CE
  - IBC 2015
  - OSHPD

DC Output		AC Input			Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps	**Overall Dimensions** W x D x H	kgs	lbs
12/24	10	100-260	3.7	253 mm x 152 mm x 74 mm (10.0 in x 6.0 in x 2.9 in)	3.6	7.9

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel–Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ Red ○ Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator distributor for availability.

G6-146 3/19c

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

Generator Set Model	Hz	Load	Sound Pressure Data in dB(A) Raw Exhaust	Open Unit, Isolated Exhaust	Weather Enclosure	Sound Enclosure
60REOZK	60	100% Load	104.4	82.0	80.1	65.3
		No Load	95.4	80.9	79.0	62.7

Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.

60REOZK	60 Hz

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A) Octave Band Center Frequency (Hz) 63	125	250	500	1000	2000	4000	8000	Overall Level
100% Load	7 (23)	Sound	3:00	48.5	55.6	60.2	57.2	55.9	60.1	52.4	50.3	65.7
			1:30	47.4	52.2	55.5	56.1	57.6	58.4	50.9	48.3	63.9
			12:00-Engine	47.4	52.9	57.3	57.8	60.6	57.4	52.5	49.6	65.3
			10:30	45.2	53.1	58.8	58.3	62.5	61.4	52.3	48.4	67.1
			9:00	49.1	56.3	59.9	57.8	56.6	58.3	51.2	48.9	65.4
			7:30	48.1	53.1	59.6	56.8	57.8	60.7	51.1	45.7	65.6
			6:00-Alternator	41.5	53.2	55.7	55.4	54.2	55.4	47.8	41.4	62.1
			4:30	41.3	53.0	57.7	57.3	56.2	61.7	52.0	47.7	65.4
			8-pos. log avg.	46.8	53.9	58.4	57.2	58.5	59.6	51.5	48.2	65.3

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A) 3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	80.2	80.2	80.1	81.7	79.8	80.4	77.4	79.8	80.1

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A) Octave Band Center Frequency (Hz) 63	125	250	500	1000	2000	4000	8000	Overall Level
100% Load	7 (23)	Open Unit, Isolated Exhaust	3:00	52.4	59.3	69.9	70.3	76.1	78.8	72.5	67.6	82.1
			1:30	51.5	62.2	69.9	73.2	78.0	76.1	72.6	66.9	82.1
			12:00-Engine	51.9	67.0	70.3	76.0	76.0	76.6	71.6	62.6	82.0
			10:30	55.0	62.1	71.6	74.8	78.9	79.2	73.0	64.3	83.6
			9:00	51.0	61.4	71.3	71.5	75.9	77.6	72.6	66.2	81.7
			7:30	46.2	58.4	70.5	71.6	78.7	77.1	71.8	65.1	82.3
			6:00-Alternator	56.4	60.2	71.1	73.0	73.8	73.0	66.9	61.6	79.3
			4:30	48.6	58.2	67.9	72.9	77.5	76.6	71.4	65.0	81.7
			8-pos. log avg.	52.6	62.1	70.4	73.3	77.1	77.2	71.8	65.3	82.0

Load	Distance, m (ft)	Exhaust	Sound Pressure Levels, dB(A) Octave Band Center Frequency (Hz) 63	125	250	500	1000	2000	4000	8000	Overall Level
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	65.5	87.3	86.3	95.8	95.3	98.8	99.0	95.6	104.4

60REOZK	60 Hz

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Sound	3:00	40.2	52.1	56.9	55.0	52.8	52.8	47.1	42.1	61.6
			1:30	42.9	48.1	56.3	55.5	54.1	53.8	47.1	40.9	61.5
			12:00-Engine	46.1	50.2	59.5	59.4	54.9	54.3	47.4	40.7	64.1
			10:30	45.3	49.2	58.5	59.1	56.8	56.7	48.4	41.8	64.3
			9:00	41.6	52.4	57.8	57.8	53.2	52.4	46.2	42.0	62.7
			7:30	39.1	49.9	57.3	56.4	55.9	56.3	46.1	39.5	62.9
			6:00-Alternator	40.4	51.1	54.6	56.0	50.5	52.9	45.5	34.6	60.7
			4:30	38.6	49.4	58.1	55.4	54.0	57.3	47.7	40.8	62.9
			8-pos. log avg.	42.6	50.5	57.6	57.1	54.4	54.9	47.0	40.7	62.7

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								
				3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
No Load	7 (23)	Weather	Overall Levels	77.9	79.9	79.6	80.6	78.0	79.6	75.3	79.2	79.0

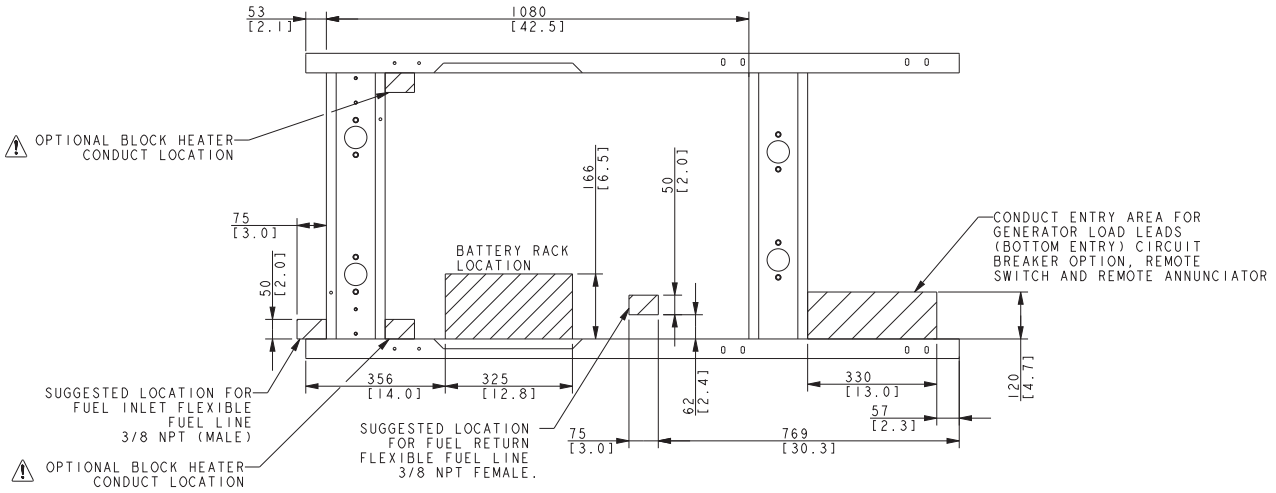
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	3:00	45.2	55.1	68.4	69.5	75.7	75.2	68.6	60.7	79.8
			1:30	43.8	56.0	69.8	73.2	78.6	75.6	70.0	62.5	81.8
			12:00-Engine	46.3	55.0	71.1	76.4	76.1	75.3	69.1	58.4	81.5
			10:30	51.1	54.7	68.0	74.5	78.4	77.6	71.4	61.9	82.5
			9:00	50.3	55.7	66.5	70.7	75.5	75.2	70.1	62.6	79.9
			7:30	52.2	55.0	69.6	71.3	78.3	75.8	70.1	63.3	81.5
			6:00-Alternator	47.6	56.3	69.9	71.1	72.3	69.9	62.6	52.2	77.2
			4:30	45.9	54.1	69.7	73.2	77.3	75.6	68.2	59.1	81.1
			8-pos. log avg.	48.7	55.3	69.3	73.0	76.9	75.4	69.3	61.0	80.9

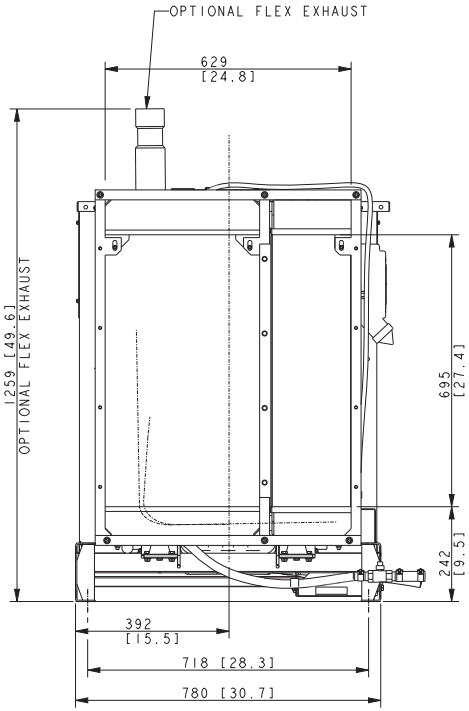
Load	Distance, m (ft)	Exhaust	Sound Pressure Levels, dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)	Raw Exhaust (No Silencer)	52.3	68.5	80.9	86.0	88.3	89.5	89.3	86.7	95.4

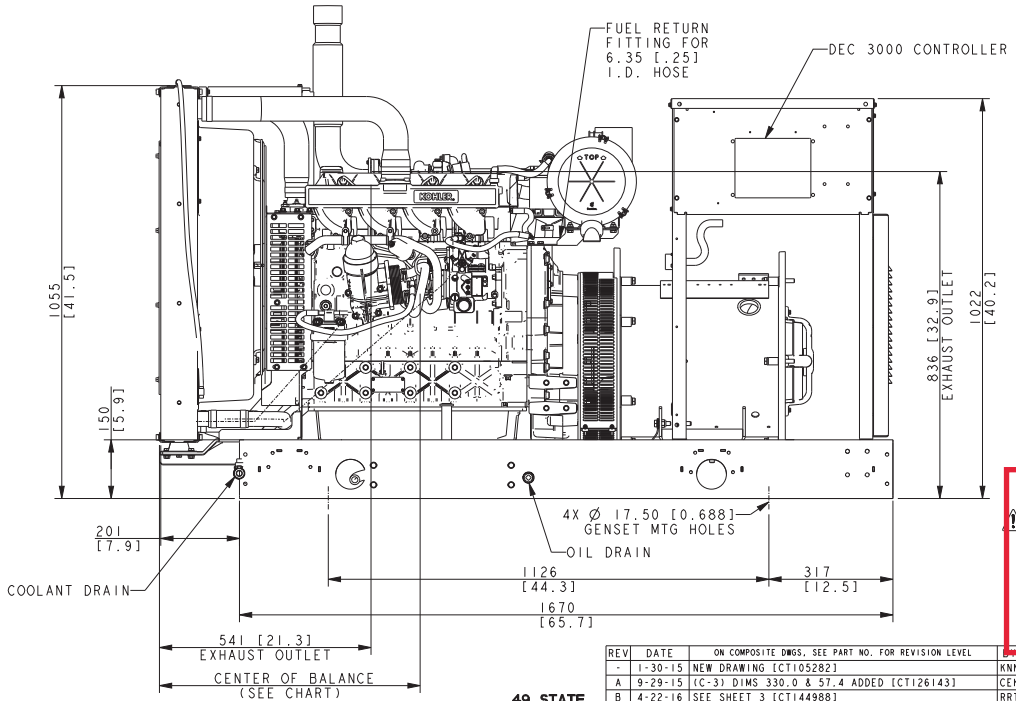
KOHLER®

Dimensional Drawings

MODEL	COB OPEN	GENSET WEIGHT (WET) KG [LBS]
40 4P/Q5X	52.6"	750 [1654]
40/50 4P/Q7BX	53.6"	787 [1735]
50/60 4P/Q8X	54"	802 [1769]
60 4P/Q10X	55"	841 [1855]







49 STATE
60HZ 4P5X, 4Q5X,
4P7BX, 4Q7BX, 4P8X,
4Q8X, 4P10X, 4Q10X,
RECON. 600V ALTERNATORS
40,50,60KW KOHLER DIESEL

NOTES:
1. WHEN SUBBASE TANK IS USED, CONDUIT MUST BE LOCATED OUTSIDE OF TANK AREA OR IN STUB-UP AREA FOR SUBBASE TANK. REFER TO SUBBASE ADV.
2. DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.
3. IF AN ENCLOSURE IS USED, THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT OR BROUGHT IN FROM THE END OF THE SKID. REFER TO ENCLOSURE ADV.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	1-30-15	NEW DRAWING [CT105282]	KNN
A	9-29-15	(C-3) DIMS 330.0 & 57.4 ADDED [CT126143]	CEK
B	4-22-16	SEE SHEET 3 [CT144988]	RRT
C	10-4-16	SEE SHEET 1 [CT161121]	ADP
D	12-22-16	(A-8) DIM. 718 [28.3] ADDED [CT168590]	ADP
E	10-20-17	SHEETS 4, 5 & 6 ADDED [CT180516]	CEK
F	2-2-18	SEE SHEETS 4 & 5 [CT184126]	CEK
G	7-23-18	SEE SHEET 1 [CT188707]	ADP

1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE: SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

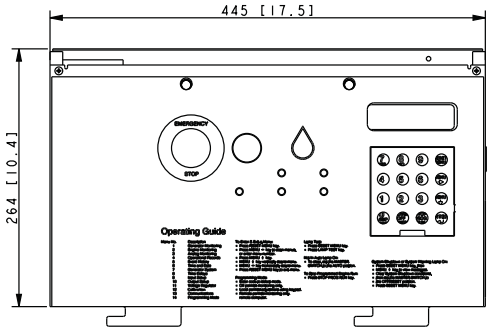
APPROVALS		DATE
DRAWN	KNN	1-30-15
CHECKED	KNN	1-30-15
APPROVED	BMK	1-30-15

METRIC | PRO-E

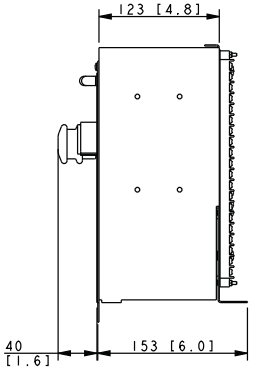
TITLE: DIMENSION PRINT 40-60 KW KDI

SCALE 0.16 | CAD NO. | SHEET 2 of 6

DWG NO. ADV-8739 | D



DEC 550



DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-15-10	NEW DRAWING [90099]	DJV

UNLESS OTHERWISE SPECIFIED:
[1] DIMENSIONS ARE IN MILLIMETERS
[2] TOLERANCES ARE:
X. XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DJV	10-15-10
CHECKED	DJV	10-15-10
APPROVED	JDZ	10-15-10

KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT, CONTROLLER

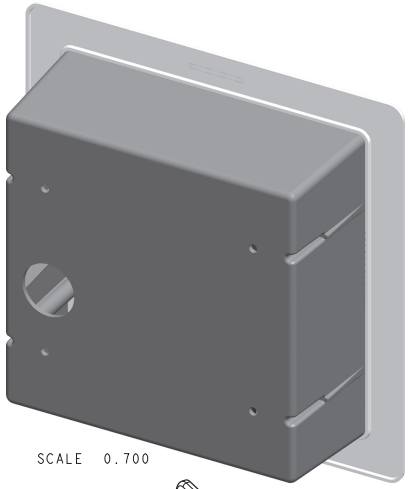
SCALE 0.40 | CAD NO. | SHEET 1 of 1
DWG NO. ADV-7935 | D

20-300KW
CONTROLLER

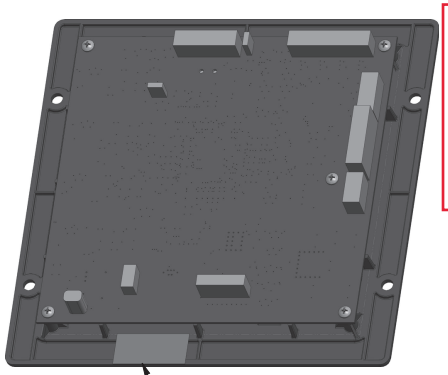
PART NO.	REV		ITEM 1	ITEM 2	ITEM 3	COMMENTS
GM85123-1	C		GM85127	GM85129	GM86126-1	MULTIPLE ATS
GM85123-2	C		GM85131	GM85129	GM86126-2	SINGLE ATS
GM85123-3	C		GM85132	-	GM86126-3	ANNUNCIATOR ONLY
GM85123-4	C		GM85133	-	GM86126-3	SDMO - ANNUNCIATOR ONLY

NOTES:
1. FUNCTIONALLY TEST ACCORDING TO ISO DOCUMENT ETF-WI-001, PER SPECIFICATION ETF-TD-003.
2. ASSEMBLE PCBA TO BACK OF BEZEL USING FIXTURE JT-0001.
3. TORQUE ALL SCREWS TO 7-10 in lbs.
4. PEEL BACKING OFF FACE PLATE AND APPLY TO BEZEL. APPLY EVEN PRESSURE TO ENTIRE SURFACE TO ENSURE COMPLETE ADHESION.

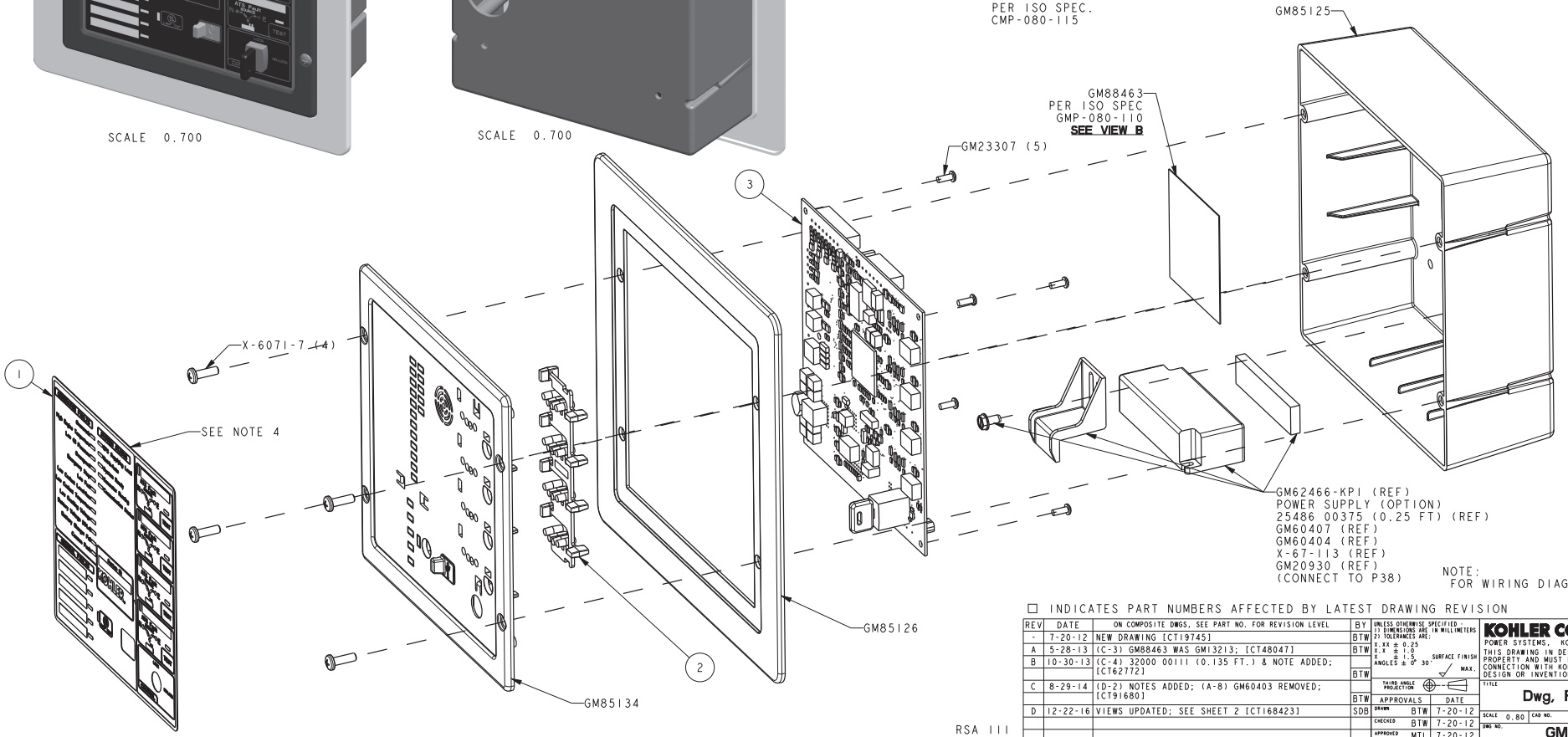
SCALE 0.700



SCALE 0.700



32000 00111 (0.135 FT.)
PER ISO SPEC.
CMP-080-115



NOTE:
FOR WIRING DIAGRAM, SEE GM62554.

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	7-20-12	NEW DRAWING [CT19745]	BTW
A	5-28-13	(C-3) GM88463 WAS GM13213; [CT48047]	BTW
B	10-30-13	(C-4) 32000 00111 (0.135 FT.) & NOTE ADDED; [CT62772]	BTW
C	8-29-14	(D-2) NOTES ADDED; (A-8) GM60403 REMOVED; [CT91680]	BTW
D	12-22-16	VIEWS UPDATED; SEE SHEET 2 [CT168423]	SDB

UNLESS OTHERWISE SPECIFIED
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ± 0.25
X .X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	7-20-12
CHECKED	BTW	7-20-12
APPROVED	MTL	7-20-12

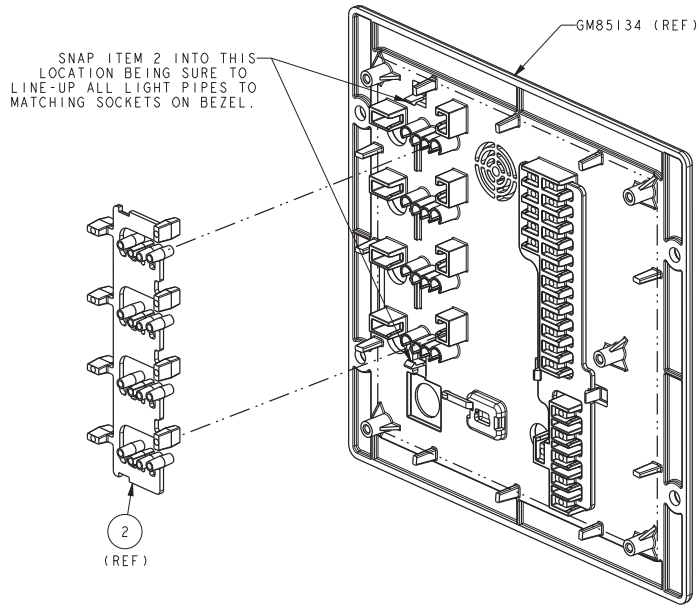
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: Dwg, RSA III Assy

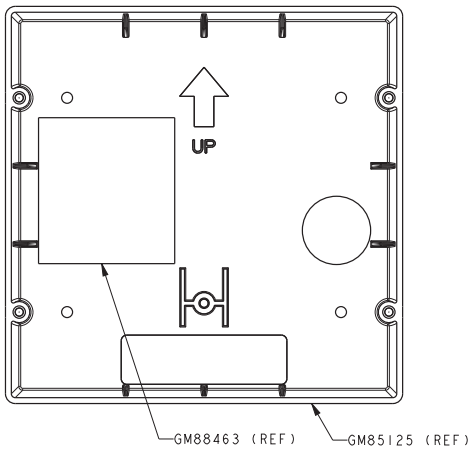
SCALE 0.80 CAD NO. SHEET 1 of 2

DWG NO. GM85123 D

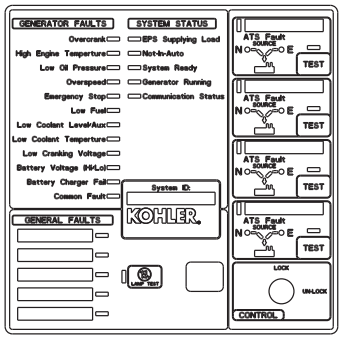
RSA III



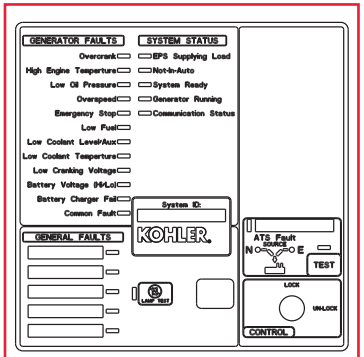
BACK VIEW OF BEZEL
SCALE 1.000



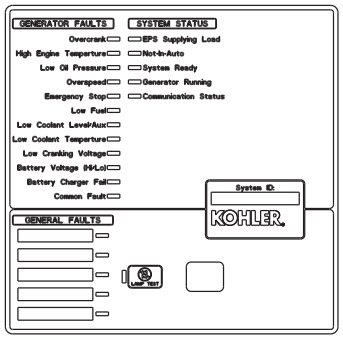
VIEW B
FRONT OF BOX



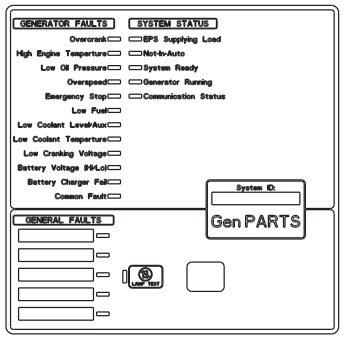
ITEM 1
(P/N: GM85127 REF)



ITEM 1
(P/N: GM85131 REF)



ITEM 1
(P/N: GM85132 REF)



ITEM 1
(P/N: GM85133 REF)

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	7-30-12	NEW DRAWING [CT19745]	BTW
A	5-28-13	(A-8) GM88463 (REF) WAS GM13213 (REF); [CT48047]	BTW
B	10-30-13	SEE SHEET 1 [CT62772]	BTW
C	8-29-14	VIEW A REMOVED; [CT91680]	BTW
D	12-22-16	VIEWS UPDATED; SEE SHEET 1 [CT168423]	SDB

UNLESS OTHERWISE SPECIFIED: (1) DIMENSIONS ARE IN MILLIMETERS (2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' SURFACE FINISH 125 MAX. THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	7-30-12
CHECKED	BTW	7-30-12
APPROVED	MTL	7-30-12

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: **Dwg, RSA III Assy**

SCALE 0.80 | CAD NO. | SHEET 2 of 2

DWG NO. **GM85123** | **D**

EVERYTHING BUT THE GENERATOR™

• Genset Enclosures • Equipment Centers • Fuel Tanks • Trailers • Iso Containers •

QUOTE

COMPANY: LOFTIN EQUIPMENT

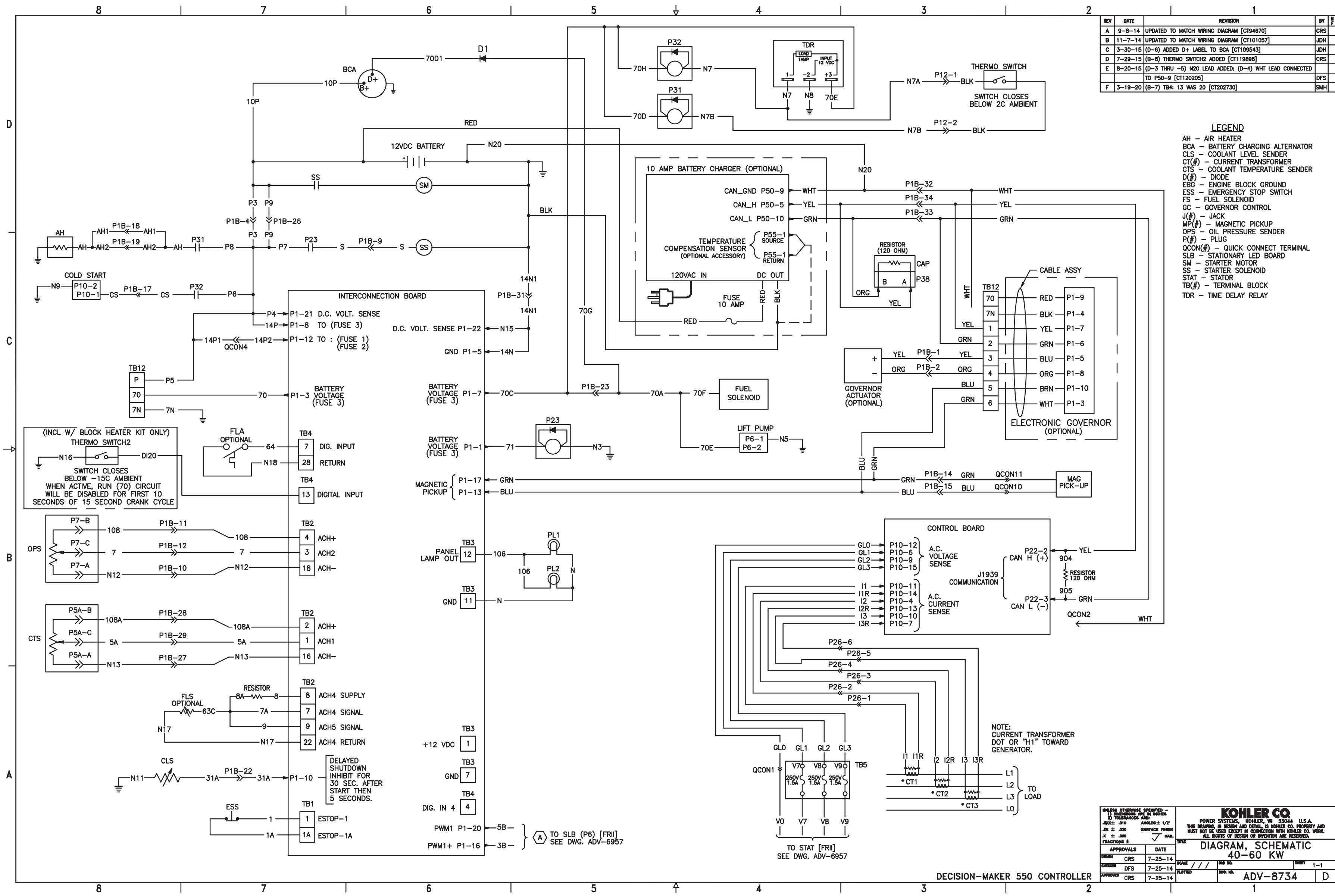
QUOTE #: 845163-02

PROJECT NAME: Sabine River

Qty	Part #	Description
		UL-142 Listed Free Standing Primary Tank
		SB20-400 Usable Gallons
		36"H x 48"W x 96"L 1,825#
1	DW-101	Double Wall Secondary Containment
1	3650	1/2" Supply/Return Dip Tube Package (2" NPT)
1	4300	Fuel in Basin Alarm (2" NPT, Top Mounted)
1	3502	Basin Drain, 1/2" NPT
1	3005	Locking Manual Fill Cap (2" NPT)
1	3152	Standard Vent Cap (2" NPT)
2	3165	Emergency Vent (5" NPT)
4	8410	Flush Mount Lifting Plate (Minimum of 4)
1	Black-Gloss	Paint Color Gloss Black (9638)
2	3195	Extra Fitting w/Plug (2" NPT) Spares
1	Special	FuelTec fuel polishing system (ships loose for installation in 4" NPT port)
1	Special	FuelTec enclosure upgraded to 316 Stainless Steel
1	1001	Krueger Fuel Gauge (2" NPT, Swing Arm)
1	1000	Low Level Alarm (2" NPT, Set at 50%)
		Options Included
1	1020	Critical High Level Alarm (2" NPT, Set at 95%)
1	3197	Extra Fitting w/Plug (4" NPT) for fuel polishing system
1	8200	5 Gallon Spill Containment (Tank Mount)
1	3190	Extra Fitting w/Plug (3/8" NPT)
1	3155CB	Clay & Bailey Overfill Prevention Valve (2" NPT)
1	1010	High Level Alarm (2" NPT, Set 5% below OFPV shutoff point)
1	1020	Critical High Level Alarm (2" NPT, Set at OFPV shutoff point)
1	AFP4	Alarm Fill Panel for Leak, Low, High and Critical High Nema 3R, Relays, DC or AC
1	AFP4I	Mount & Wire Alarm Panel near Fill

KOHLER®

Wiring Schematics


REV | DATE | REVISION | BY
A | 9-8-14 | UPDATED TO MATCH WIRING DIAGRAM [CT94670] | CRS
B | 11-7-14 | UPDATED TO MATCH WIRING DIAGRAM [CT101057] | JDH
C | 3-30-15 | (D-6) ADDED D+ LABEL TO BCA [CT109543] | JDH
D | 7-29-15 | (B-8) THERMO SWITCH2 ADDED [CT119898] | CRS
E | 8-20-15 | (D-3 THRU -5) N20 LEAD ADDED; (D-4) WHT LEAD CONNECTED TO P50-9 [CT120205] | DFS
F | 3-19-20 | (B-7) TB4: 13 WAS 20 [CT202730] | SMH
LEGEND
AH – AIR HEATER
BCA – BATTERY CHARGING ALTERNATOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENDER
D(#) – DIODE
EBG – ENGINE BLOCK GROUND
ESS – EMERGENCY STOP SWITCH
FS – FUEL SOLENOID
GC – GOVERNOR CONTROL
J(#) – JACK
MP(#) – MAGNETIC PICKUP
OPS – OIL PRESSURE SENDER
P(#) – PLUG
QCON(#) – QUICK CONNECT TERMINAL
SLB – STATIONARY LED BOARD
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
TB(#) – TERMINAL BLOCK
TDR – TIME DELAY RELAY
INTERCONNECTION BOARD
CONTROL BOARD
10 AMP BATTERY CHARGER (OPTIONAL)
ELECTRONIC GOVERNOR (OPTIONAL)
GOVERNOR ACTUATOR (OPTIONAL)
12VDC BATTERY
FUEL SOLENOID
LIFT PUMP
MAG PICK-UP
THERMO SWITCH
SWITCH CLOSES BELOW 2C AMBIENT
(INCL W/ BLOCK HEATER KIT ONLY) THERMO SWITCH2
SWITCH CLOSES BELOW -15C AMBIENT WHEN ACTIVE, RUN (70) CIRCUIT WILL BE DISABLED FOR FIRST 10 SECONDS OF 15 SECOND CRANK CYCLE
DELAYED SHUTDOWN INHIBIT FOR 30 SEC. AFTER START THEN 5 SECONDS.
NOTE: CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
TO STAT [FRII] SEE DWG. ADV-6957
TO SLB (P6) [FRII] SEE DWG. ADV-6957
TO LOAD
UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 .XX ± .030 .X ± .060 FRACTIONS ± ANGLES± 1/2° SURFACE FINISH MAX.
APPROVALS | DATE
DRAWN CRS | 7-25-14
CHECKED DFS | 7-25-14
APPROVED CRS | 7-25-14
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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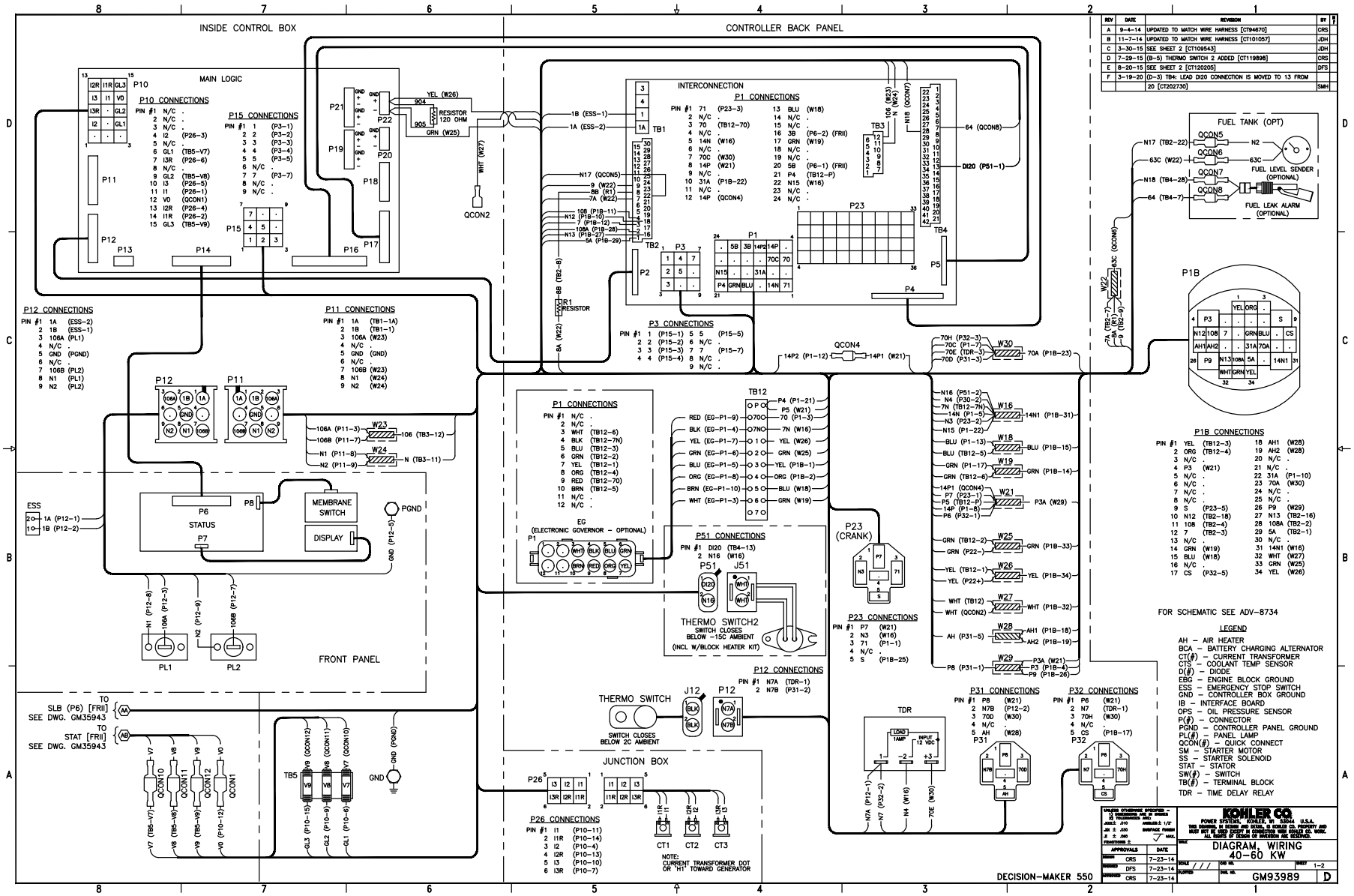
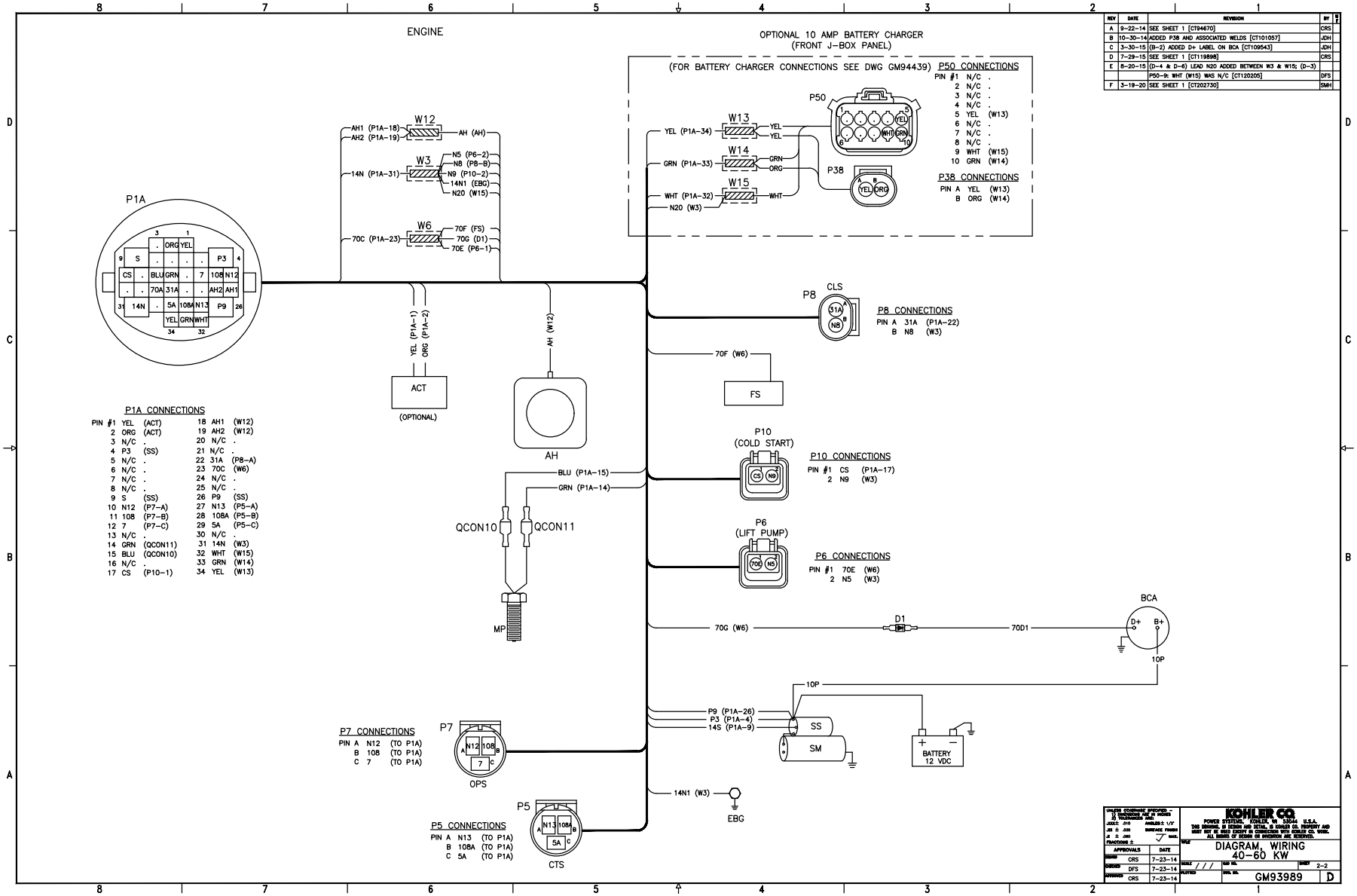
TITLE DIAGRAM, SCHEMATIC 40-60 KW
SCALE / / /
SHEET 1-1
DWG. NO. ADV-8734 D
DECISION-MAKER 550 CONTROLLER



REV	DATE	REVISION	BY
A	9-4-14	UPDATED TO MATCH WIRE HARNESS [CT94670]	CRS
B	11-7-14	UPDATED TO MATCH WIRE HARNESS [CT101057]	JDH
C	3-30-15	SEE SHEET 2 [CT109543]	JDH
D	7-29-15	(D-5) THERMO SWITCH 2 ADDED [CT119898]	CRS
E	8-20-15	SEE SHEET 2 [CT120205]	DFS
F	3-19-20	(D-3) TB4: LEAD DI20 CONNECTION IS MOVED TO 13 FROM 20 [CT202730]	SMH



REV	DATE	REVISION	BY
A	9-22-14	SEE SHEET 1 [CT94670]	CRS
B	10-30-14	ADDED P38 AND ASSOCIATED WELDS [CT101057]	JDH
C	3-30-15	(B-2) ADDED D+ LABEL ON BCA [CT109543]	JDH
D	7-29-15	SEE SHEET 1 [CT119898]	CRS
E	8-20-15	(D-4 & D-6) LEAD N20 ADDED BETWEEN W3 & W15; (D-3)	
		P50-9: WHT (W15) WAS N/C [CT120205]	DFS
F	3-19-20	SEE SHEET 1 [CT202730]	SMH

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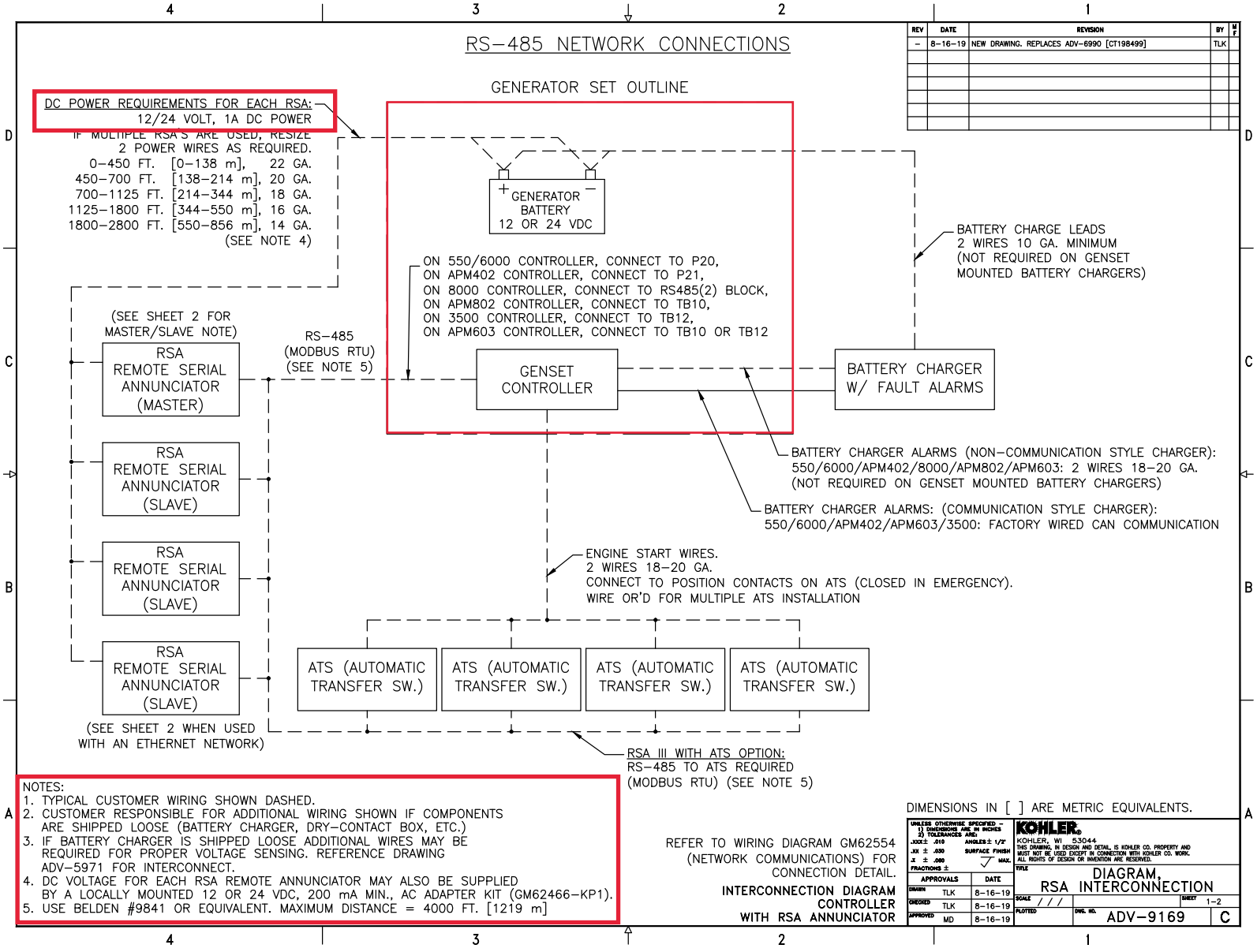
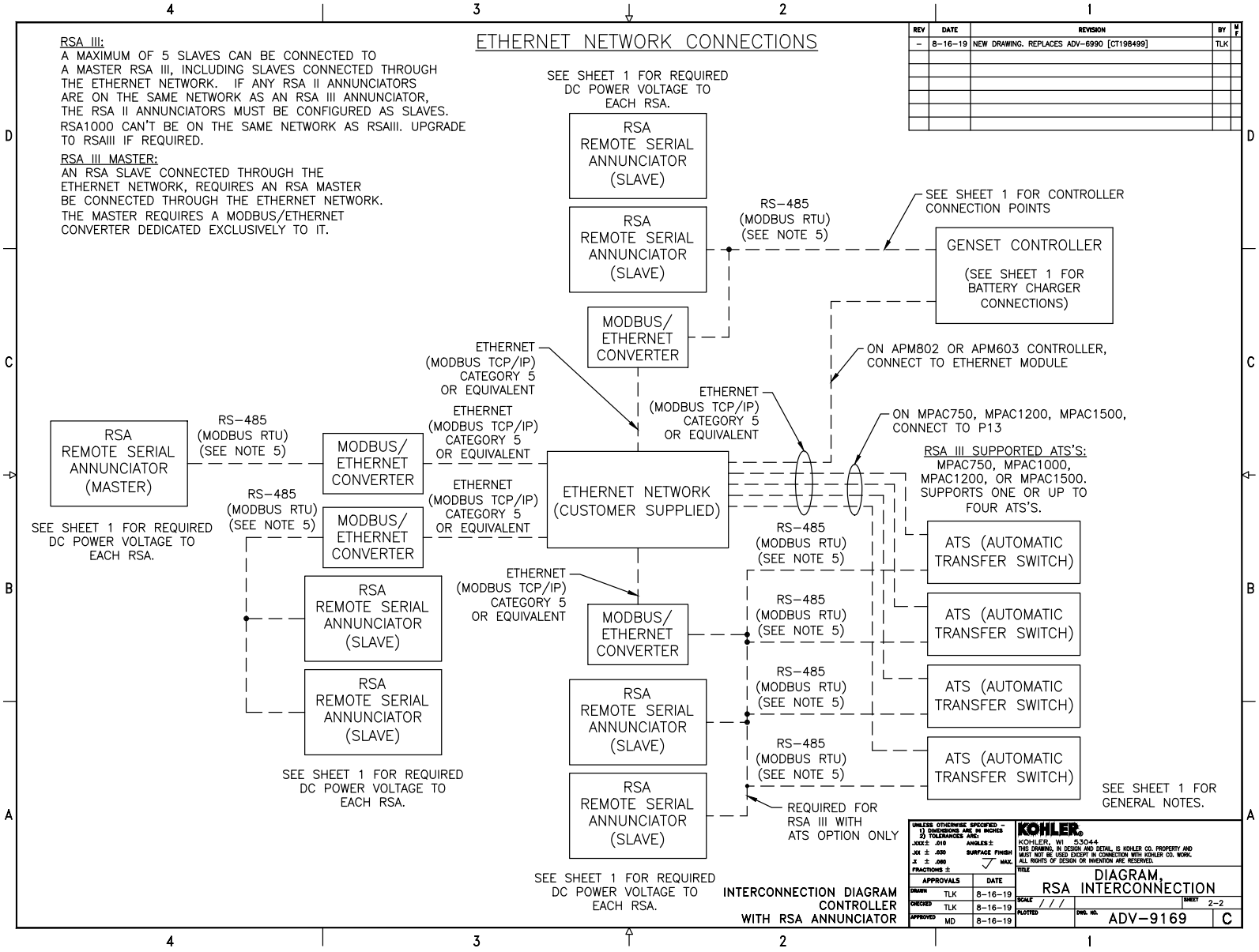
APPROVALS	DATE
CRS	7-23-14
DFS	7-23-14
CRS	7-23-14

DIAGRAM, WIRING
40-60 KW

SIZE D | DWG NO. GM93989 | REV F | SHEET 2-2 | SCALE NONE


RS–485 NETWORK CONNECTIONS
GENERATOR SET OUTLINE
DC POWER REQUIREMENTS FOR EACH RSA:
12/24 VOLT, 1A DC POWER
IF MULTIPLE RSA'S ARE USED, RESIZE
2 POWER WIRES AS REQUIRED.
0–450 FT. [0–138 m], 22 GA.
450–700 FT. [138–214 m], 20 GA.
700–1125 FT. [214–344 m], 18 GA.
1125–1800 FT. [344–550 m], 16 GA.
1800–2800 FT. [550–856 m], 14 GA.
(SEE NOTE 4)
+ GENERATOR BATTERY 12 OR 24 VDC –
BATTERY CHARGE LEADS
2 WIRES 10 GA. MINIMUM
(NOT REQUIRED ON GENSET
MOUNTED BATTERY CHARGERS)
ON 550/6000 CONTROLLER, CONNECT TO P20,
ON APM402 CONTROLLER, CONNECT TO P21,
ON 8000 CONTROLLER, CONNECT TO RS485(2) BLOCK,
ON APM802 CONTROLLER, CONNECT TO TB10,
ON 3500 CONTROLLER, CONNECT TO TB12,
ON APM603 CONTROLLER, CONNECT TO TB10 OR TB12
(SEE SHEET 2 FOR MASTER/SLAVE NOTE)
RS–485 (MODBUS RTU) (SEE NOTE 5)
RSA REMOTE SERIAL ANNUNCIATOR (MASTER)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
GENSET CONTROLLER
BATTERY CHARGER W/ FAULT ALARMS
BATTERY CHARGER ALARMS (NON–COMMUNICATION STYLE CHARGER):
550/6000/APM402/8000/APM802/APM603: 2 WIRES 18–20 GA.
(NOT REQUIRED ON GENSET MOUNTED BATTERY CHARGERS)
BATTERY CHARGER ALARMS: (COMMUNICATION STYLE CHARGER):
550/6000/APM402/APM603/3500: FACTORY WIRED CAN COMMUNICATION
ENGINE START WIRES.
2 WIRES 18–20 GA.
CONNECT TO POSITION CONTACTS ON ATS (CLOSED IN EMERGENCY).
WIRE OR'D FOR MULTIPLE ATS INSTALLATION
ATS (AUTOMATIC TRANSFER SW.)
ATS (AUTOMATIC TRANSFER SW.)
ATS (AUTOMATIC TRANSFER SW.)
ATS (AUTOMATIC TRANSFER SW.)
(SEE SHEET 2 WHEN USED WITH AN ETHERNET NETWORK)
RSA III WITH ATS OPTION:
RS–485 TO ATS REQUIRED
(MODBUS RTU) (SEE NOTE 5)
NOTES:
1. TYPICAL CUSTOMER WIRING SHOWN DASHED.
2. CUSTOMER RESPONSIBLE FOR ADDITIONAL WIRING SHOWN IF COMPONENTS ARE SHIPPED LOOSE (BATTERY CHARGER, DRY–CONTACT BOX, ETC.)
3. IF BATTERY CHARGER IS SHIPPED LOOSE ADDITIONAL WIRES MAY BE REQUIRED FOR PROPER VOLTAGE SENSING. REFERENCE DRAWING ADV–5971 FOR INTERCONNECT.
4. DC VOLTAGE FOR EACH RSA REMOTE ANNUNCIATOR MAY ALSO BE SUPPLIED BY A LOCALLY MOUNTED 12 OR 24 VDC, 200 mA MIN., AC ADAPTER KIT (GM62466–KP1).
5. USE BELDEN #9841 OR EQUIVALENT. MAXIMUM DISTANCE = 4000 FT. [1219 m]
REFER TO WIRING DIAGRAM GM62554 (NETWORK COMMUNICATIONS) FOR CONNECTION DETAIL.
INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR
DIMENSIONS IN [ ] ARE METRIC EQUIVALENTS.
REV DATE REVISION BY
– 8–16–19 NEW DRAWING. REPLACES ADV–6990 [CT198499] TLK
KOHLER, WI 53044
APPROVALS DATE
DRAWN TLK 8–16–19
CHECKED TLK 8–16–19
APPROVED MD 8–16–19
TITLE DIAGRAM, RSA INTERCONNECTION
SCALE NONE SHEET 1–2
PLOTTED DWG. NO. ADV–9169 C


ETHERNET NETWORK CONNECTIONS
RSA III:
A MAXIMUM OF 5 SLAVES CAN BE CONNECTED TO A MASTER RSA III, INCLUDING SLAVES CONNECTED THROUGH THE ETHERNET NETWORK. IF ANY RSA II ANNUNCIATORS ARE ON THE SAME NETWORK AS AN RSA III ANNUNCIATOR, THE RSA II ANNUNCIATORS MUST BE CONFIGURED AS SLAVES. RSA1000 CAN'T BE ON THE SAME NETWORK AS RSAIII. UPGRADE TO RSAIII IF REQUIRED.
RSA III MASTER:
AN RSA SLAVE CONNECTED THROUGH THE ETHERNET NETWORK, REQUIRES AN RSA MASTER BE CONNECTED THROUGH THE ETHERNET NETWORK. THE MASTER REQUIRES A MODBUS/ETHERNET CONVERTER DEDICATED EXCLUSIVELY TO IT.
REV DATE REVISION BY
– 8-16-19 NEW DRAWING. REPLACES ADV-6990 [CT198499] TLK
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RS-485 (MODBUS RTU) (SEE NOTE 5)
SEE SHEET 1 FOR CONTROLLER CONNECTION POINTS
GENSET CONTROLLER
(SEE SHEET 1 FOR BATTERY CHARGER CONNECTIONS)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ON APM802 OR APM603 CONTROLLER, CONNECT TO ETHERNET MODULE
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ON MPAC750, MPAC1200, MPAC1500, CONNECT TO P13
RSA III SUPPORTED ATS'S:
MPAC750, MPAC1000, MPAC1200, OR MPAC1500. SUPPORTS ONE OR UP TO FOUR ATS'S.
RSA REMOTE SERIAL ANNUNCIATOR (MASTER)
RS-485 (MODBUS RTU) (SEE NOTE 5)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
ETHERNET NETWORK (CUSTOMER SUPPLIED)
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
RS-485 (MODBUS RTU) (SEE NOTE 5)
MODBUS/ ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
ETHERNET (MODBUS TCP/IP) CATEGORY 5 OR EQUIVALENT
MODBUS/ ETHERNET CONVERTER
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
RS-485 (MODBUS RTU) (SEE NOTE 5)
ATS (AUTOMATIC TRANSFER SWITCH)
RSA REMOTE SERIAL ANNUNCIATOR (SLAVE)
REQUIRED FOR RSA III WITH ATS OPTION ONLY
SEE SHEET 1 FOR GENERAL NOTES.
SEE SHEET 1 FOR REQUIRED DC POWER VOLTAGE TO EACH RSA.
INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR
KOHLER CO.
KOHLER, WI 53044
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APPROVALS DATE
DRAWN TLK 8-16-19
CHECKED TLK 8-16-19
APPROVED MD 8-16-19
DIAGRAM, RSA INTERCONNECTION
SCALE /// SHEET 2-2
PLOTTED DWG. NO. ADV-9169 C

Drawing Sheet Reference	
Sheet	**Description**
1	Networked Devices, General Notes, This Sheet
2	Converters, Ethernet Network, PC, Data Interface System
3	16-Light (DEC3+), 550 (DEC550), KPC 1000 Legacy Genset Controllers
4	DEC3000 / APM402 Genset Controller
5	DEC6000 Genset Controller
6	APM603 Genset Controller for non-KD series, Standard PGEN Network
7	This Sheet Reserved for Future Features
8	APM603 Genset Controller for KD Series, Standard PGEN Network
9	This Sheet Reserved for Future Features
10	APM802 Genset Controller
11	DEC8000 Genset Controller
12	DEC3500 Genset Controller, Towable 10 Position Customer Terminal Block
13	Series 1000 (MPAC1000), 340 (M340/M340+), Power Monitor Legacy ATS (Automatic Transfer Switch Controllers)
14	MPAC1500, MPAC-DM 750/1200/1500 ATS (Automatic Transfer Switch Controllers)
15	Legacy RSAII (Remote Serial Annunciator)
16	RSAIII (Remote Serial Annunciator)

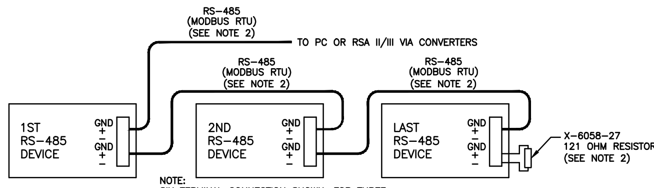
REV	DATE	REVISION	BY	MF
N	5-30-19	THIS SHEET ADDED; COMPATIBILITY CHART, STANDARD NOTES,		
		AND NETWORKED DEVICES MOVED TO THIS SHEET; ISOLATED/		
		NON-ISOLATED RS-485 IDENTIFIED ON ALL SHEETS [CT197795]	TLK	
P	6-24-20	(D-8) SHEET 6 NOTE: NON-KD SERIES WAS JOHN DEERE		
		80-500 KW, SHEET 12 NOTE: ADDED		
		TOWABLE 10 POSITION CUSTOMER TERMINAL BLOCK [CT204963]	TLK	

Controller/Annunciator Compatibility Chart

	Monitor III	SiteTech	RSA2	RSA3
550 Genset	X	X	X	X
16-Light Genset	X		X	X
DEC 3000 / APM402 Genset	X	X	X	X
KPC 1000 Genset			X	X
6000 Genset	X	X	X	X
8000 Genset				4
APM802				X
APM603		X		X
DEC-3500 Genset		X		X
MPAC 1500	X		X	X
MPAC-DM 750, 1200, 1500		X	X	X
Series 1000 ATS	X		X	X
340 ATS	X			
340 Power Monitor	X			

"X" Designates supported devices. "4" Designates RS-485 Only.

DETAIL A (EXAMPLE OF)
NETWORKED RS-485 DEVICES



NOTE:
SIX TERMINAL CONNECTION SHOWN. FOR THREE TERMINAL CONNECTION, USE TWO WIRES PER TERMINAL STRIP SCREW.

NOTES:

1.) MAXIMUM CABLE LENGTH FOR RS-232 IS 50 FEET. USE RS-485 IF LONGER THAN 50 FEET IS REQ'D.

2.) CUSTOMER SUPPLIED WIRE. USE BELDEN #9841 OR EQUIVALENT CABLE. USE A MAXIMUM CABLE LENGTH OF 1219 METERS (4000 FT.) FROM THE RS-485 CONVERTER TO THE LAST RS-485 DEVICE IN THE NETWORK. THE "LAST DEVICE" IS THE DEVICE FURTHEST FROM THE CONTROLLER. CONNECT "+" TO "+", "−" TO "−". CONNECT THE CABLE SHIELD TO "GND" AT ONE END OF CABLE ONLY, LEAVE OTHER END DISCONNECTED. IF OPERATING OVER 19.2 K BAUD RATE AND WIRE LENGTH > 305 METERS (1000 FT.), CONNECT 121 OHM TERMINATING RESISTOR (X-6058-27) TO "+" AND "−" ON THE LAST DEVICE ON THE NETWORK. IF ONLY ONE DEVICE IS USED, IT IS THE LAST DEVICE. THE TERMINATING RESISTOR IS SELECTABLE INSIDE THE MODBUS/ETHERNET CONVERTER AND REMOTE SERIAL ANNUNCIATOR2 (RSA2) VIA P34. PLACE THE P34 JUMPER ON THE "IN" PINS IF THE MODBUS/ETHERNET CONVERTER, RSA2, OR RSA3 IS THE LAST DEVICE IN THE NETWORK. IF NOT THE LAST DEVICE, PLACE THE P34 JUMPER ON THE "OUT" PINS.

3.) THE 550 & 6000 CONTROLLER CAN BE USED AS A RS-232/RS-485 CONVERTER. CONNECT THE 9-PIN SERIAL PORT ON THE PC TO P18 ON THE 550 OR 6000 CONTROLLER AS SHOWN. THEN CONNECT P20 ON THE 550 OR 6000 CONTROLLER TO THE OTHER RS-485 DEVICES IN THE NETWORK.

4.) EACH MODBUS/ETHERNET CONVERTER CAN COMMUNICATE WITH UP TO 4 ETHERNET NETWORK DEVICES SIMULTANEOUSLY. IF A MODBUS/ETHERNET CONVERTER IS ATTACHED TO A SLAVE REMOTE SERIAL ANNUNCIATOR, A MODBUS/ETHERNET CONVERTER CONNECTED TO A MASTER REMOTE SERIAL ANNUNCIATOR IS REQUIRED. SEE NOTE 2 FOR P34 (TERMINATING RESISTOR) SETTING.

5.) ONLY ONE MASTER IS ALLOWED PER RS-485 NETWORK. ANY COMBINATION OF MASTERS IS ALLOWED IF COMMUNICATING VIA MODBUS/ETHERNET CONVERTERS.

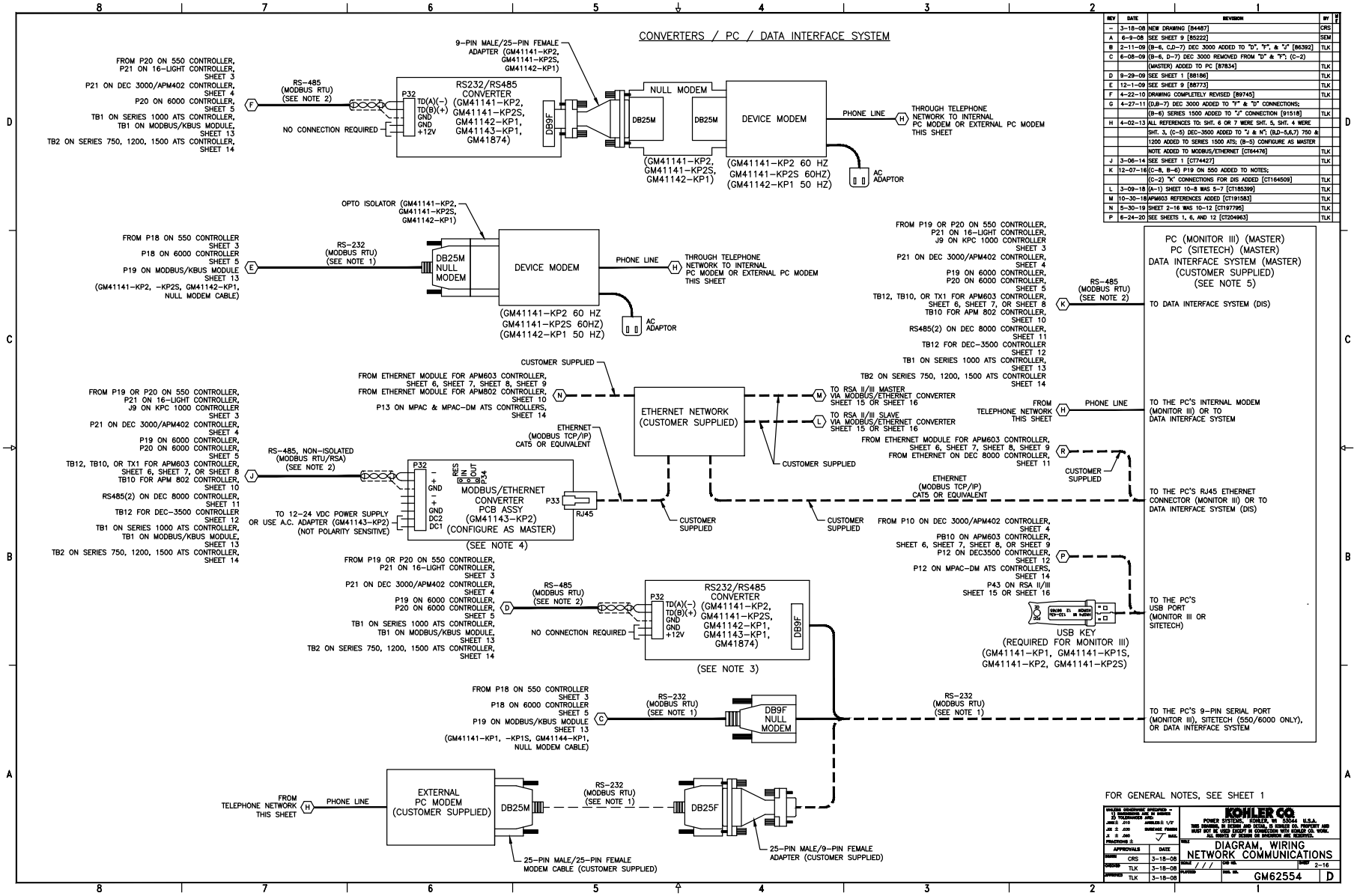
UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	TLK	5-30-19
CHECKED	TLK	5-30-19
APPROVED	MD	5-30-19

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE: / / / | CAD NO. | SHEET: 1-16
PLOTTED | DWG. NO. GM62554 | D



REV	DATE	REVISION	BY
–	3-18-08	NEW DRAWING [84487]	CRS
A	6-9-08	SEE SHEET 9 [85222]	SEM
B	2-11-09	(B-6, C,D-7) DEC 3000 ADDED TO "D", "F", & "J" [86392]	TLK
C	6-08-09	(B-6, D-7) DEC 3000 REMOVED FROM "D" & "F"; (C-2) (MASTER) ADDED TO PC [87834]	TLK
D	9-29-09	SEE SHEET 1 [88186]	TLK
E	12-1-09	SEE SHEET 9 [88773]	TLK
F	4-22-10	DRAWING COMPLETELY REVISED [89745]	TLK
G	4-27-11	(D,B-7) DEC 3000 ADDED TO "F" & "D" CONNECTIONS; (B-6) SERIES 1500 ADDED TO "J" CONNECTION [91518]	TLK
H	4-02-13	ALL REFERENCES TO: SHT. 6 OR 7 WERE SHT. 5, SHT. 4 WERE SHT. 3, (C-5) DEC-3500 ADDED TO "J & N"; (B,D-5,6,7) 750 & 1200 ADDED TO SERIES 1500 ATS; (B-5) CONFIGURE AS MASTER NOTE ADDED TO MODBUS/ETHERNET [C164476]	TLK
J	3-06-14	SEE SHEET 1 [C174427]	TLK
K	12-07-16	(C-8, B-6) P19 ON 550 ADDED TO NOTES; (C-2) "K" CONNECTIONS FOR DIS ADDED [C164509]	TLK
L	3-09-18	(A-1) SHEET 10-8 WAS 5-7 [C185399]	TLK
M	10-30-18	APM603 REFERENCES ADDED [C191583]	TLK
N	5-30-19	SHEET 2-16 WAS 10-12 [C197795]	TLK
P	6-24-20	SEE SHEETS 1, 6, AND 12 [C204963]	TLK

UNLESS OTHERWISE SPECIFIED — 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XX ± .010, .XXX ± .005, FRACTIONS ± 1/64, ANGLES ± 1/2°, SURFACE FINISH 125 MAX.

APPROVALS	DATE
DRAWN CRS	3-18-08
CHECKED TLK	3-18-08
APPROVED TLK	3-18-08

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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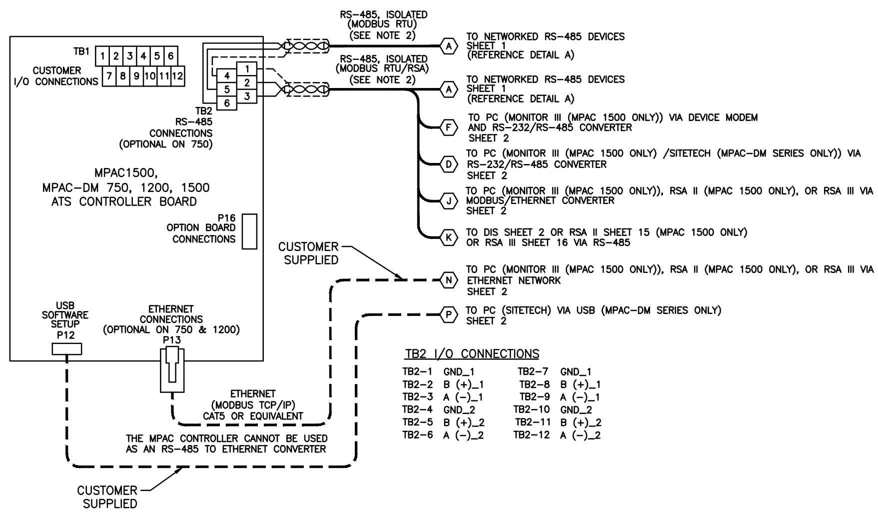
TITLE: DIAGRAM, WIRING NETWORK COMMUNICATIONS
SCALE: /// DWG NO. SHEET 2-16
PLOTTED: DWG. NO. GM62554 D

REV	DATE	REVISION	BY	MF
N	5-30-19	THIS SHEET ADDED; MPAC MOVED TO THIS SHEET [CT197795]	TLK	
P	6-24-20	SEE SHEETS 1, 6, AND 12 [CT204963]	TLK	

MPAC ATS CONTROLLERS



TB2 I/O CONNECTIONS

TB2-1	GND_1	TB2-7	GND_1
TB2-2	B (+)_1	TB2-8	B (+)_1
TB2-3	A (-)_1	TB2-9	A (-)_1
TB2-4	GND_2	TB2-10	GND_2
TB2-5	B (+)_2	TB2-11	B (+)_2
TB2-6	A (-)_2	TB2-12	A (-)_2

FOR GENERAL NOTES, SEE SHEET 1

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	TLK	5-30-19
CHECKED	TLK	5-30-19
APPROVED	MD	5-30-19

KOHLER CO.
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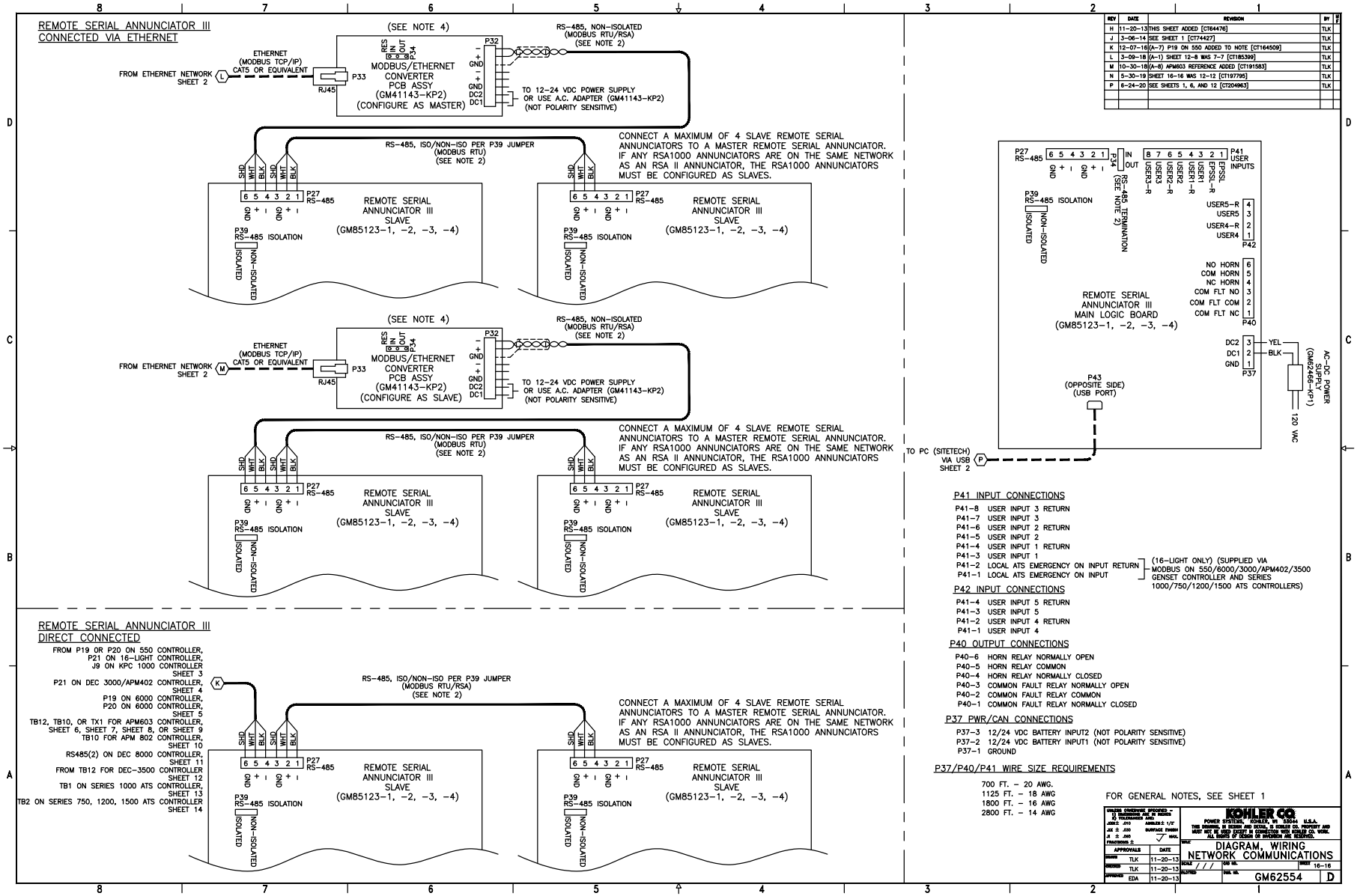
TITLE: DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE: / / / CAD NO. SHEET: 14-16
PLOTTED DWG. NO. GM62554 D


REMOTE SERIAL ANNUNCIATOR III
CONNECTED VIA ETHERNET
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
RJ45
P33
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS MASTER)
P32
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
P27
RS-485
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
RJ45
P33
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS SLAVE)
P32
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
P27
RS-485
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
REMOTE SERIAL ANNUNCIATOR III
DIRECT CONNECTED
FROM P19 OR P20 ON 550 CONTROLLER,
P21 ON 16-LIGHT CONTROLLER,
J9 ON KPC 1000 CONTROLLER
SHEET 3
P21 ON DEC 3000/APM402 CONTROLLER,
SHEET 4
P19 ON 6000 CONTROLLER,
P20 ON 6000 CONTROLLER,
SHEET 5
TB12, TB10, OR TX1 FOR APM603 CONTROLLER,
SHEET 6, SHEET 7, SHEET 8, OR SHEET 9
TB10 FOR APM 802 CONTROLLER,
SHEET 10
RS485(2) ON DEC 8000 CONTROLLER,
SHEET 11
FROM TB12 FOR DEC-3500 CONTROLLER
SHEET 12
TB1 ON SERIES 1000 ATS CONTROLLER,
SHEET 13
TB2 ON SERIES 750, 1200, 1500 ATS CONTROLLER
SHEET 14
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU/RSA)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
P27
RS-485
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
P27
RS-485
P34
IN
OUT
P41
USER
INPUTS
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
RS-485 TERMINATION
(SEE NOTE 2)
P42
P40
REMOTE SERIAL
ANNUNCIATOR III
MAIN LOGIC BOARD
(GM85123-1, -2, -3, -4)
P37
P43
(OPPOSITE SIDE)
(USB PORT)
TO PC (SITETECH)
VIA USB
SHEET 2
AC-DC POWER
SUPPLY
(GM62466-KP1)
120 VAC
P41 INPUT CONNECTIONS
P41-8 USER INPUT 3 RETURN
P41-7 USER INPUT 3
P41-6 USER INPUT 2 RETURN
P41-5 USER INPUT 2
P41-4 USER INPUT 1 RETURN
P41-3 USER INPUT 1
P41-2 LOCAL ATS EMERGENCY ON INPUT RETURN
P41-1 LOCAL ATS EMERGENCY ON INPUT
(16-LIGHT ONLY) (SUPPLIED VIA
MODBUS ON 550/6000/3000/APM402/3500
GENSET CONTROLLER AND SERIES
1000/750/1200/1500 ATS CONTROLLERS)
P42 INPUT CONNECTIONS
P41-4 USER INPUT 5 RETURN
P41-3 USER INPUT 5
P41-2 USER INPUT 4 RETURN
P41-1 USER INPUT 4
P40 OUTPUT CONNECTIONS
P40-6 HORN RELAY NORMALLY OPEN
P40-5 HORN RELAY COMMON
P40-4 HORN RELAY NORMALLY CLOSED
P40-3 COMMON FAULT RELAY NORMALLY OPEN
P40-2 COMMON FAULT RELAY COMMON
P40-1 COMMON FAULT RELAY NORMALLY CLOSED
P37 PWR/CAN CONNECTIONS
P37-3 12/24 VDC BATTERY INPUT2 (NOT POLARITY SENSITIVE)
P37-2 12/24 VDC BATTERY INPUT1 (NOT POLARITY SENSITIVE)
P37-1 GROUND
P37/P40/P41 WIRE SIZE REQUIREMENTS
700 FT. - 20 AWG.
1125 FT. - 18 AWG
1800 FT. - 16 AWG
2800 FT. - 14 AWG
FOR GENERAL NOTES, SEE SHEET 1
REV DATE REVISION BY
H 11-20-13 THIS SHEET ADDED [CT64476] TLK
J 3-06-14 SEE SHEET 1 [CT74427] TLK
K 12-07-16 (A-7) P19 ON 550 ADDED TO NOTE [CT164509] TLK
L 3-09-18 (A-1) SHEET 12-8 WAS 7-7 [CT185399] TLK
M 10-30-18 (A-8) APM603 REFERENCE ADDED [CT191583] TLK
N 5-30-19 SHEET 16-16 WAS 12-12 [CT197795] TLK
P 6-24-20 SEE SHEETS 1, 6, AND 12 [CT204963] TLK
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
DIAGRAM, WIRING
NETWORK COMMUNICATIONS
APPROVALS DATE
DRAWN TLK 11-20-13
CHECKED TLK 11-20-13
APPROVED EDA 11-20-13
SCALE NONE
SHEET 16-16
DWG NO. GM62554
REV D

POLARIS™
Pre-Insulated Connectors
Multi-Conductor Connector, One Side Wire Entry
IPL Series Cont'd

c UL us LISTED

FEATURES

- Wire entry ports on one side only.
- Eliminates the need for cover and taping.
- Insulated with high-dielectric strength plastisol.
- Molded for precise fit and supplied with removable access plugs over the hex screws.
- Abrasion and chemical resistant.
- UV resistant.
- Will not support combustion.

SPECIFICATIONS

- UL Listed 486B Wire Connector (Dry location).
- **Temperature Rating/Voltage:** AL9CU.
  Cold temperature rated to -45 °C, rated 600V, 90 °C.
- **Wire Type:** Dual rated for use with copper and/or aluminum cables.
  Not for fine-stranded, flexible wire.
- **Torque Chart:** 34.

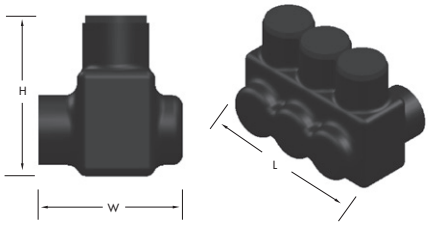


Figure varies by number of wire ports.

CAT. NO.	CERTIFICATION	NO. OF PORTS	WIRE RANGE	COPPER CONDUCTOR MAX. AMPS	ALUMINUM CONDUCTOR MAX. AMPS	LENGTH (L) (IN.)	WIDTH (W) (IN.)	HEIGHT (H) (IN.)	MAX. TORQUE VALUE (IN./LBS.)	HEX/WRENCH SIZE (IN.)	STD. CTN. QTY.
IPL250-3	cULus	3	250 MCM-6 AWG	–	–	2.930	2.030	2.180	360	5/16	6
IPL250-4*	cULus	4	250 MCM-6 AWG	527A	410 A	3.800	2.030	2.180	360	5/16	4
IPL250-5	cULus	5	250 MCM-6 AWG	–	–	4.660	2.030	2.180	360	5/16	4
IPL250-6*	cULus	6	250 MCM-6 AWG	790 A	615 A	5.220	2.030	2.180	360	5/16	3
IPL250-8*	cULus	8	250 MCM-6 AWG	1053 A	820 A	7.240	2.030	2.180	360	5/16	4
IPL350-3	cULus	3	350 MCM-6 AWG	–	–	3.470	2.130	2.460	400	5/16	3
IPL350-4*	cULus	4	350 MCM-6 AWG	657 A	514 A	4.540	2.130	2.460	400	5/16	3
IPL350-5	cULus	5	350 MCM-6 AWG	–	–	5.570	2.130	2.460	400	5/16	2
IPL350-6*	cULus	6	350 MCM-6 AWG	985 A	770 A	6.620	2.130	2.460	400	5/16	2
IPL350-8*	cULus	8	350 MCM-6 AWG	1314 A	1028 A	8.720	2.130	2.460	400	5/16	3
IPL500-3	cULus	3	500 MCM-4 AWG	–	–	3.960	2.500	2.940	450	5/16	3
IPL500-4*	cULus	4	500 MCM-4 AWG	806 A	631 A	5.110	2.500	2.940	450	5/16	2
IPL500-5	cULus	5	500 MCM-4 AWG	–	–	6.250	2.500	2.940	450	5/16	2
IPL500-6*	cULus	6	500 MCM-4 AWG	1209 A	946 A	7.400	2.500	2.940	450	5/16	2
IPL500-7	cULus	7	500 MCM-4 AWG	–	–	8.590	2.500	2.940	450	5/16	2
IPL500-8*	cULus	8	500 MCM-4 AWG	1612 A	1262 A	9.690	2.500	2.940	450	5/16	3
IPL600-3	cULus	3	600 MCM-6 AWG	–	–	4.470	2.710	3.020	550	5/16	2
IPL600-4*	cULus	4	600 MCM-6 AWG	1035 A	810 A	5.770	2.710	3.020	550	5/16	2
IPL600-6*	cULus	6	600 MCM-6 AWG	1554 A	1215 A	8.370	2.710	3.020	550	5/16	3
IPL750-3	–	3	750-250 MCM	–	–	4.950	3.090	3.490	550	3/8	2
IPL750-4	–	4	750-250 MCM	–	–	6.380	3.090	3.490	550	3/8	1
IPL750-5	–	5	750-250 MCM	–	–	7.800	3.090	3.490	550	3/8	1
IPL750-6	–	6	750-250 MCM	–	–	9.230	3.090	3.490	550	3/8	1

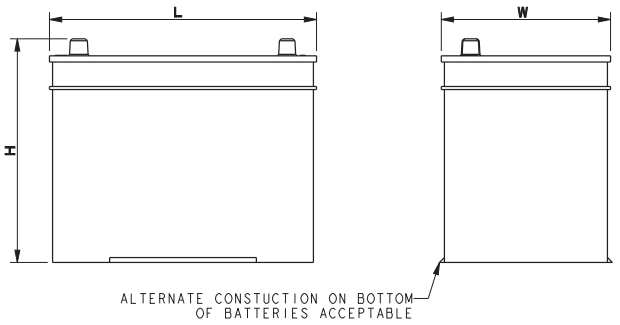
PARALLEL RATED

*An "Industry First" by providing a UL Listed 486A/B connector with code compliant and UL Listed maximum ampacity for Copper and Aluminum parallel conductors.

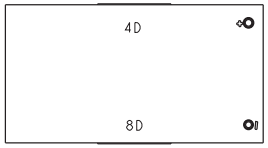
PART NO.	REV		SAE DIMENSION L	SAE DIMENSION W	SAE DIMENSION H	VOLTAGE	COLD CRANKING AMPS AT 0°F MINIMUM	RESERVE CAP MINUTES AT 80°F MINIMUM	POST LAYOUT /STYLE	CHARGE TYPE	BATTERY CONSTRUCTION	BCI GROUP	INTERNAL RESISTANCE (MΩ)
~~244578~~	~~AF~~		~~333.5 [13.13]~~	~~181.1 [7.13]~~	~~238.5 [9.39]~~	~~6~~	~~700~~	~~275~~	~~B/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~244750~~	~~AD~~		~~342.9 [13.50]~~	~~173.2 [6.82]~~	~~238.3 [9.38]~~	~~12~~	~~600~~	~~165~~	~~D/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~239102~~	~~AK~~		~~198.1 [7.80]~~	~~133.4 [5.25]~~	~~187.5 [7.38]~~	~~12~~	~~200~~	~~32~~	~~D/2~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~289515~~	~~AC~~		~~539.8 [21.25]~~	~~282.7 [11.13]~~	~~276.4 [10.88]~~	~~12~~	~~1150~~	~~450~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~291918~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299981~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~254425~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~1000~~	~~200~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299982~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~200~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324367~~	~~BM~~		~~208.0 [8.19]~~	~~179.4 [7.06]~~	~~196.9 [7.75]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~324368~~	~~AC~~		~~206.5 [8.13]~~	~~166.9 [6.57]~~	~~205.2 [8.08]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324586~~	~~BU~~	☐	~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~185~~	~~C/3~~	~~WET~~	~~SEE NOTE 2~~	~~31~~	-
324587	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	950	200	C/3	DRY	SEE NOTE 2	31	-
~~256984~~	~~BT~~	☐	~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~650~~	~~120~~	~~D/1~~	~~WET~~	~~SEE NOTE 1~~	~~24~~	-
225289	BR		273.0 [10.75]	173.0 [6.81]	228.6 [9.00]	12	650	130	D/1	DRY	SEE NOTE 1	24	-
~~345197~~	~~BS~~		~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~510~~	~~80~~	~~E/1~~	~~WET~~	~~SEE NOTE 2~~	~~24F~~	-
354147	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	700	170	C/3	WET	SEE NOTE 2	31	-
~~354148~~	~~BU~~		~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 2~~	~~31~~	-
345309	BR		219.2 [8.63]	153.9 [6.06]	212.9 [8.38]	12	525	-	E/1	WET	SEE NOTE 1	55	-
~~GM22348~~	~~AC~~		~~525.3 [20.68]~~	~~220.5 [8.68]~~	~~251.0 [9.88]~~	~~12~~	~~1000~~	~~320~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
GM22349	BR		527.1 [20.75]	282.4 [11.12]	276.4 [10.88]	12	1150	400	A/1	DRY	SEE NOTE 1	8D	-
~~GM34399~~	~~BT~~	☐	~~527.1 [20.75]~~	~~282.4 [11.12]~~	~~276.4 [10.88]~~	~~12~~	~~1400~~	~~430~~	~~A/1~~	~~WET~~	~~SEE NOTE 1~~	~~8D~~	-
~~GM48784~~	~~BT~~	☐	~~208.0 [8.19]~~	~~173.0 [6.81]~~	~~196.9 [7.75]~~	~~12~~	~~525~~	~~70~~	~~D/1~~	~~WET~~		~~26~~	-
~~GM75512~~	~~BT~~	☐	~~238.0 [9.38]~~	~~129.0 [5.06]~~	~~223.0 [8.81]~~	~~12~~	~~500~~	~~85~~	~~D/1~~	~~WET~~	-	~~51~~	-
10702000701	A		527.1 [20.75]	216.0 [8.50]	258.0 [10.16]	12	1050	290	A/1	WET	-	4D	-
10702001800	A		527.1 [20.75]	216.0 [8.50]	254.0 [10.0]	12	1110	380	A/1	AGM	SEE NOTE 3	4D	-
GM106681	-	☐	260.0 [10.25]	171.0 [6.75]	208.0 [8.19]	12	690	105	D/1	WET	-	34	4.29
GM106375	-	☐	330.2 [13.00]	171.0 [6.75]	239.8 [9.44]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31
GM106373	-	☐	260.0 [10.25]	171.0 [6.75]	229.0 [9.00]	12	650	95	D/1	WET	SEE NOTE 1	24	4.71
GM106377	-	☐	527.1 [20.75]	279.0 [11.0]	254.0 [10.00]	12	1400	380	A/1	WET	SEE NOTE 1	80	2.53
GM106369	-	☐	208.0 [8.19]	172.0 [6.77]	200.0 [7.87]	12	500	95	D/1	WET	-	26	5.85
GM106374	-	☐	237.0 [9.32]	125.0 [4.94]	220.0 [8.66]	12	500	70	D/1	WET	-	51	5.00

NOTE: DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

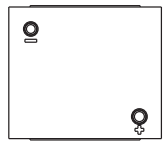
☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION



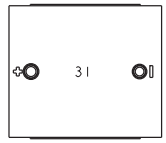
LAYOUT A



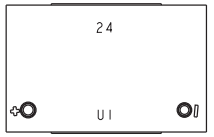
LAYOUT B



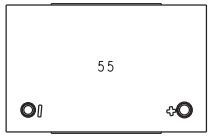
LAYOUT C



LAYOUT D



LAYOUT E



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
BY	5-6-16	(C-6) 10702001800: COLD CRANKING AMPS 1110	
		WAS 1100 [CTI46053]	BGW
CA	4-15-19	(C-8) GM106681, GM106375, GM106373,	
		GM106377, GM106369 & GM106374 ADDED; (D-3)	
		INTERNAL RESISTANCE (MΩ) COLUMN ADDED;	
		(D-8) 324586 & 256984 VOIDED; (C-8)	
		GM34399, GM48784, GM75512	
		VOIDED;(A,B-8,7,6,5,4) VIEWS & NOTES MOVED	
		TO SHEET 2, SHEET 2 ADDED [CTI94425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0°30'
SURFACE FINISH 1.6 MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN SLR	4-15-19
CHECKED EB	4-15-19
APPROVED RAD	4-15-19

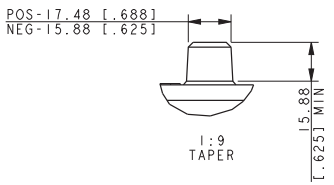
KOHLER.
KOHLER, WISCONSIN 53044

TITLE: DWG, BATTERY, DRY CHARGED

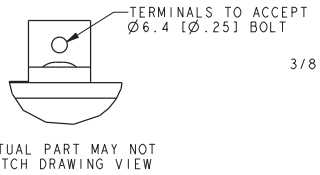
SCALE 0.30 | CAD NO. | SHEET 1 of 2

DWG NO. 244578-CMP | D

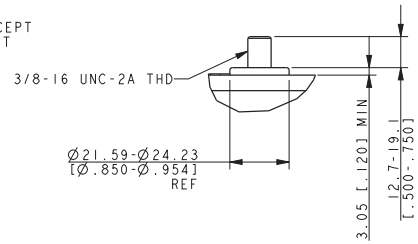
STYLE 1



STYLE 2



STYLE 3



NOTES:
1) STYLE 3 CAN BE CONVERTED TO STYLE 1 BY INSTALLATION OF 254427 STUD CONVERTION KIT.
2) BATTERIES USING ``STYLE 3'' STUDS MUST HAVE EITHER THE ``POS'' OR ``NEG'' STUD CLEARLY IDENTIFIED.
3) STYLE 3 TERMINAL TORQUE 10 Nm [15 FT LBS].
4) "POS" & "NEG" IDENTIFICATION MUST BE MARKED AS SHOWN ON THE PART LAYOUT AND WITHIN 5mm OF THE STUD.

NOTES: (APPLIES TO ALL BATTERIES)
SAE J537 DIMENSIONS ARE MAX ALLOWABLE DIMENSIONS.
COLD CRANKING AMPS ARE MINIMUM ACCEPTABLE VALUES.
HOLD DOWN DESIGN IN COMPLIANCE WITH SAE STANDARDS.
BATTERY WARNING LABEL TO BE LOCATED ON TAP OF BATTERY. (BETWEEN TERMINALS ON LAYOUT D)
MANUFACTURER MUST PROVIDE A CERTIFICATE CONTAINING MFGRS. NAME, MFGRS. PART NUMBER,
AND KOHLER PART NUMBER CERTIFYING THAT THE BATTERY WAS BUIT TO INDUSTRY STANDARDS.
SEE N.F.P.A.-110 FOR SPECIFIC DETAILS. CERTIFICATE REQUIRED ONLY ONCE PER BATTERY PART NUMBER.
MAY NOT BE CALCIUM-CALCIUTYPE.

NOTES: (CHARGE TYPE)
ALL DRY CHARGED BATTERIES MUST BE SUPPLIED WITH ACTIVATION INSTRUCTIONS ADHERED TO BATTERY
AND LOOSE. BATTERY MUST ALSO BE IDENTIFED ON TOP AS: ``DRY CHARGED, MUST ADD BATTERY GRADE
ELECTROLYTE, SEE ACTIVATION INSTRUCTIONS''.
BATTERIES SHOULD BE RECEIVED APPROPRIATELY MARKED AS DRYCHARGED OR WET STORAGE.
ONE OF THE BATTERY POSTS MUST BE SHIELDED WHEN BATTERIES ARE WET CHARGED.
BATTERIES WHEN SHIPPED DRY - DO NOT REQUIRE POST PROTECTORS.

NOTES: (BATTERY CONSTRUCTION)
1) MUST BE LEAD-CALCIUM HYBRID OR LEAD-ANTIMONY TYPE.
2) LEAD-CALCIUM GRID.
3) ABSORBED GLASS MAT. (AGM)

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
CA	4-15-19	NEW DRAWING; SEE SHEET 1 [CT194425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.3
ANGLES ± 0°30'
SURFACE FINISH 63 MAX.
THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DS	4-15-19
CHECKED	GFR	4-15-19
APPROVED	AMM	4-15-19

KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DWG, BATTERY, DRY CHARGED

SCALE 0.30 | CAD NO. | SHEET 2 of 2

DWG NO. 244578-CMP | D

OVERVIEW:
THE AUTOMATIC MULTI-LEVEL FLOAT/ EQUALIZE CHARGER SPECIFIED BELOW IS INTENDED TO CHARGE ENGINE STARTING BATTERIES EITHER INDEPENDENT OR IN CONJUNCTION WITH AN ENGINE DRIVEN CHARGING SYSTEM.

BATTERY TYPES TO BE CHARGED:
- LEAD ACID
  - AGM
  - GEL CELL
  - HIGH PERFORMANCE AGM
  - FLOODED
- NICKEL CADMIUM (NiCd)

INPUT AC:
- INPUT VOLTAGE: 90-265V SINGLE PHASE
- INPUT FREQUENCY: 47-63 Hz

INPUT LEAD:
APPROXIMATELY 1.8M (72") (REF) TYPE SJTOW -40°C TO 105°C UL RATED WIRE AND INSULATION. TERMINATED IN PRE-MOLDED UL RATED 3 PRONG NEMA 5-15 MALE AC PLUG.

DC OUTPUT:
10A @ 12V
10A @ 24V
VOLTAGE REGULATION: +/-1% (VOLTAGE AT EACH STAGE IS TOPOLOGY DEPENDENT)

OUTPUT LEAD:
APPROX. 1.8M (72") (REF) TYPE SJTOOW -40°C TO 105°C UL RATED WIRE WITH RED AND BLACK WIRE INSULATION. TERMINATED IN 9.5 mm (REF) RING STYLE TERMINALS.

FUSES:
THE FUSE MUST BE LOCATED APPROXIMATELY 6" FROM RING TERMINAL ON RED OUTPUT LEAD.
20A ATC

ENVIRONMENTAL:
- STORAGE TEMPERATURE RANGE: -40 TO +85°C (-40 TO +185°F)
- OPERATING TEMPERATURE RANGE: -20 TO +70°C (-4 TO +158°F)
- HUMIDITY: 5 TO 95% (NON-CONDENSING)
- SALT SPRAY TESTING - ASTM B117
- CORROSIN RESISTANT FROM GASSING OF BATTERIES

REVERSE POLARITY PROTECTION:
THE CHARGER SHALL SUSTAIN NO DAMAGE WHEN INCORRECTLY CONNECTED TO THE BATTERY IN REVERSE ORIENTATION.

MOUNTING:
4 NON-THREADED THROUGH HOLES FOR M6 FASTENERS TO PASS THOUGH

ENCLOSURE:
SHALL PROTECT THE CHARGER COMPONENTS FROM RAIN, SNOW, DUST AND DRIPPING WATER AND UNINTENTIONAL INPACTS. ALL INTERNAL COMPONENTS PROTECTED FROM WATER DROPLETS.

INDICATORS:
- POWER: INDICATES THE ACCEPTABILITY OF AC INPUT TO THE CHARGER
- COMMUNICATION: INDICATES THE STATE OF THE COMMUNICATION SYSTEM
- TEMPERATURE COMPENSATION: INDICATES THE STATE OF THE TEMPERATUARE COMPENSATION SUBSYSTEM WHEN INSTALLED
- VOLTAGE OUTPUT: INDICATES THE STATE OF THE BATTERY AND CERTAIN FAULT CONDITIONS.

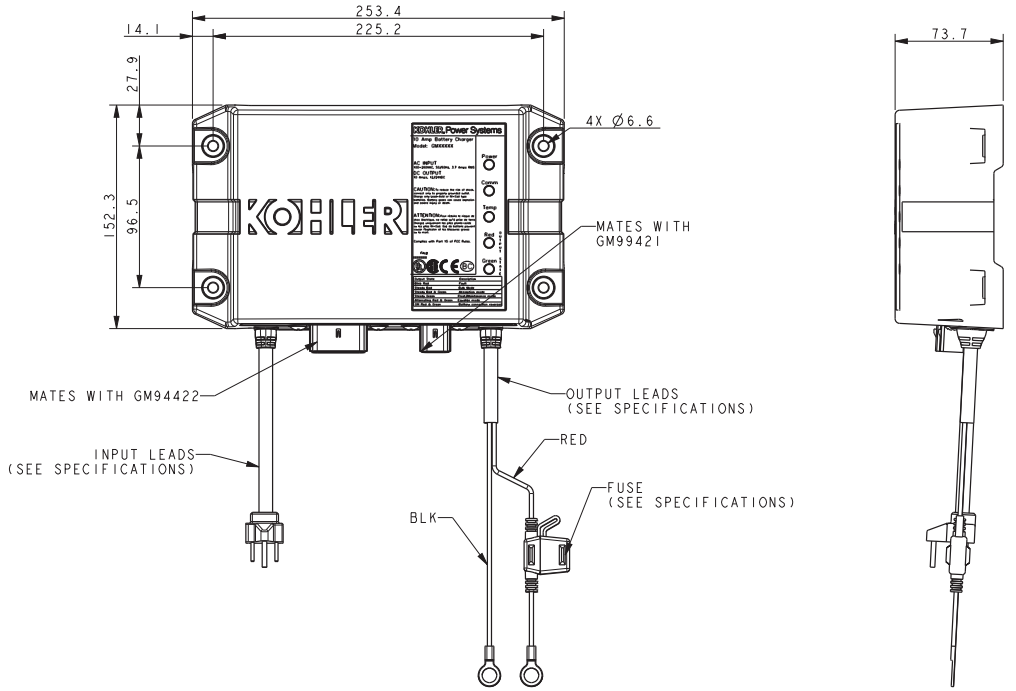
DOCUMENTATION:
THERE SHALL BE AN INSTALLATION / OPERATIONAL MANUAL SUPPLIED WITH EACH CHARGER. PER KOHLER SUPPLIED ARTWORK.

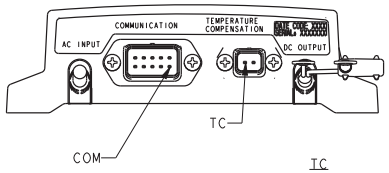
CERTIFICATIONS (US AND CANADA):
- UL1236
- CSA - C22.2 NO 107.2-01
- FCC- TITLE 47, PART 15 CLASS A
- CE
- EN 61000-6-2
- CEC AND DOE
- NFPA-110 LEVEL1 (WHEN SUPPORTED WITH APPLICABLE KOHLER CONTROLLER)
- IBC

PRODUCT LABELING:
THE LABEL ATTACHED TO THE CHARGER SHALL HAVE THE FOLLOWING INFORMATION:
- UL LISTING
- KOHLER PART NUMBER
- DESCRIPTION OF ALL INDICATOR
- OUTPUT CURRENT AND VOLTAGE
- INPUT VOLTAGE AND FREQUENCY

PACKAGING LABEL:
THE PACKAGING LABEL SHALL CONTAIN THE FOLLOWING INFORMATION:
- KOHLER P/N
- DESCRIPTION - BATTERY CHARGER
- MFG. MODEL NO.
- MFG. PART NUMBER
- DATE CODE

WARRANTY:
2 YEAR FROM DATE OF PURCHASE FROM MANUFACTURE.





COM
PIN 1 N/C
2 ID SEL 1
3 ID SEL 2
4 N/C
5 CAN-H
6 N/C
7 ID SEL 1 RTN
8 ID SEL 2 RTN
9 CAN-GND
10 CAN-L

TC
PIN 1 TC SENSOR W1
2 TC SENSOR W2

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-22-14	NEW DRAWING [CT91634]	SAM
A	5-9-17	(C-4,2) MATING NOTE ADDED (A-2, 4) PIN CONNECTIONS ADDED [CT174256]	SAM

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

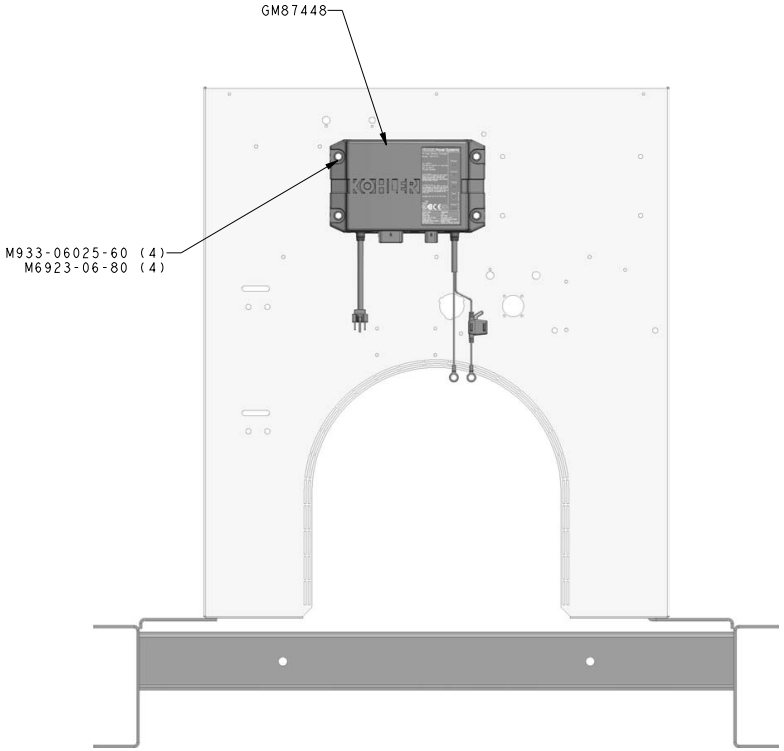
APPROVALS		DATE
DRAWN	SAM	9-22-14
CHECKED	SAM	9-22-14
APPROVED	AGT	9-22-14

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

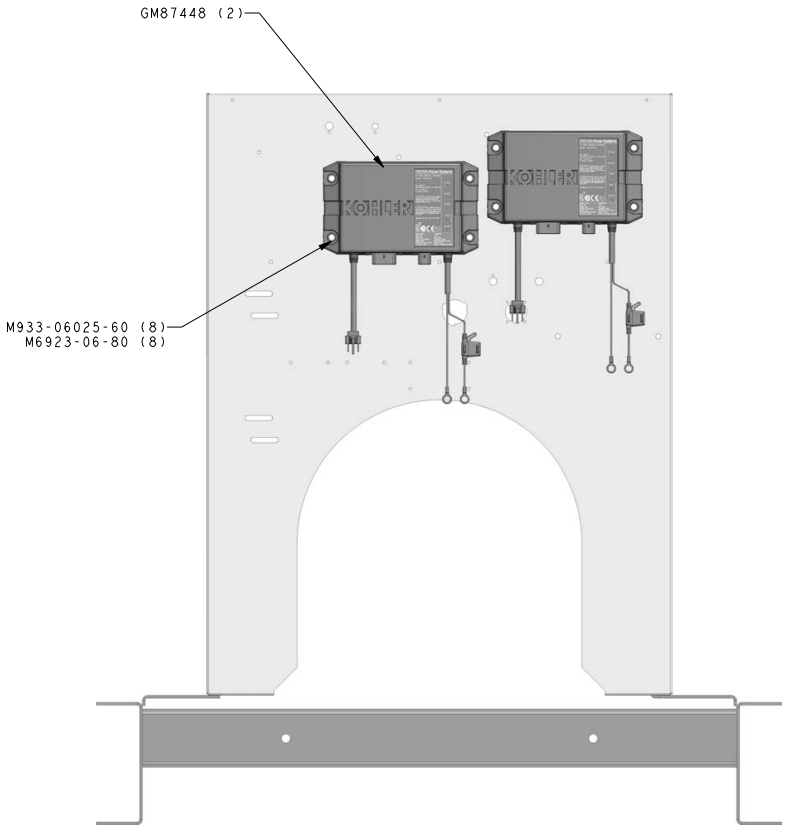
TITLE
CHARGER, BATTERY 10 AMP

SCALE 0.50 | CAD NO. | SHEET 1 of 1
DWG NO. GM87448 | D

KIT NUMBER	VIEW	DESCRIPTION
GM94447-KA1	VIEW 1	BATTERY CHARGER, FLOAT 12V 10A
GM94447-KA2	VIEW 2	BATTERY CHARGER, FLOAT 24V 10A



VIEW 1



VIEW 2

NOTE: FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-23-14	NEW DRAWING [CT94502]	SAM

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH ✓ MAX.
THIRD ANGLE PROJECTION

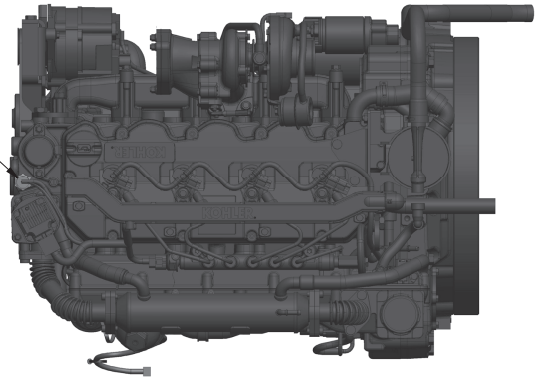
APPROVALS		DATE
DRAWN	SAM	9-23-14
CHECKED	SAM	9-23-14
APPROVED	AGT	9-23-14

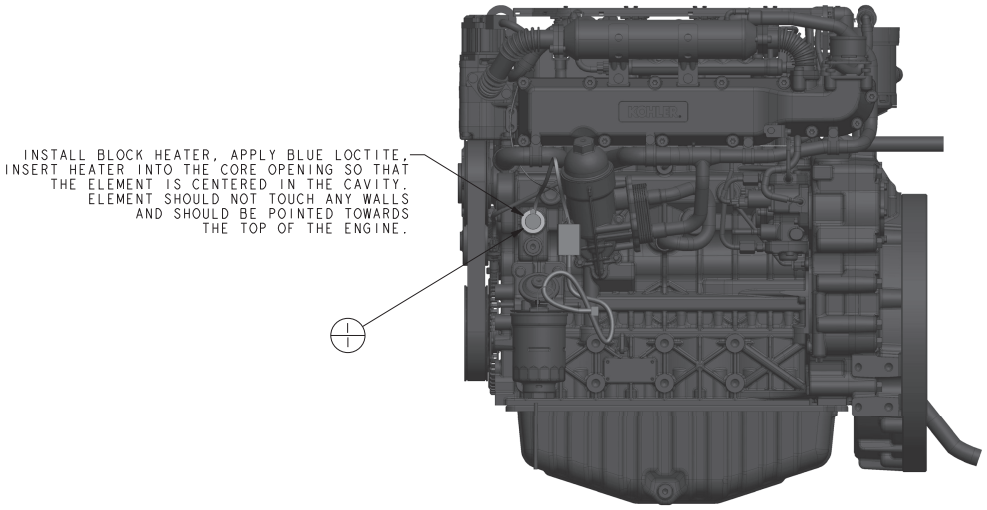
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

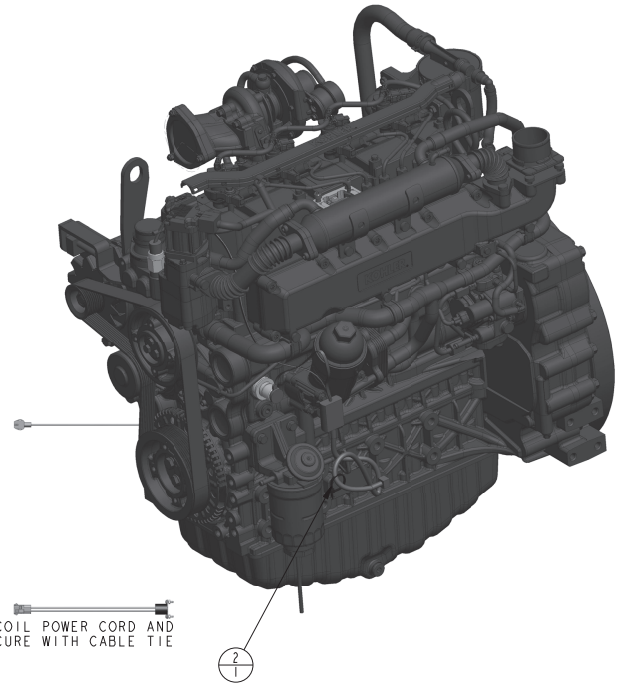
TITLE
DWG, ASSY BATTERY CHARGER

SCALE 0.40 | CAD NO. | SHEET 1 of 1
DWG NO. GM94447 | D

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM102361-KA1				BLOCK HEATER, 120V, 1000W, AQMD
	1	GM103076	1	HEATER, BLOCK, 120V 1000W
	2	X-468-1	1	TIE, CABLE
THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.				







NOTE: FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-12-17	NEW DRAWING [CTI75538]	CEK
A	1-24-18	GM102361-KA2 ADDED, SHEET 2 ADDED [CTI83674]	CEK
B	4-27-18	SEE SHEET 2 [CTI85140]	SB
C	11-28-18	SHEET 3 ADDED [CTI91939]	APB

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0°30'. SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CEK	6-12-17
CHECKED	CEK	6-12-17
APPROVED	RMF	6-12-17

TITLE: DWG, BLOCK HEATER, 120V 1000W

SCALE 0.25 | CAD NO. | SHEET 1 of 3

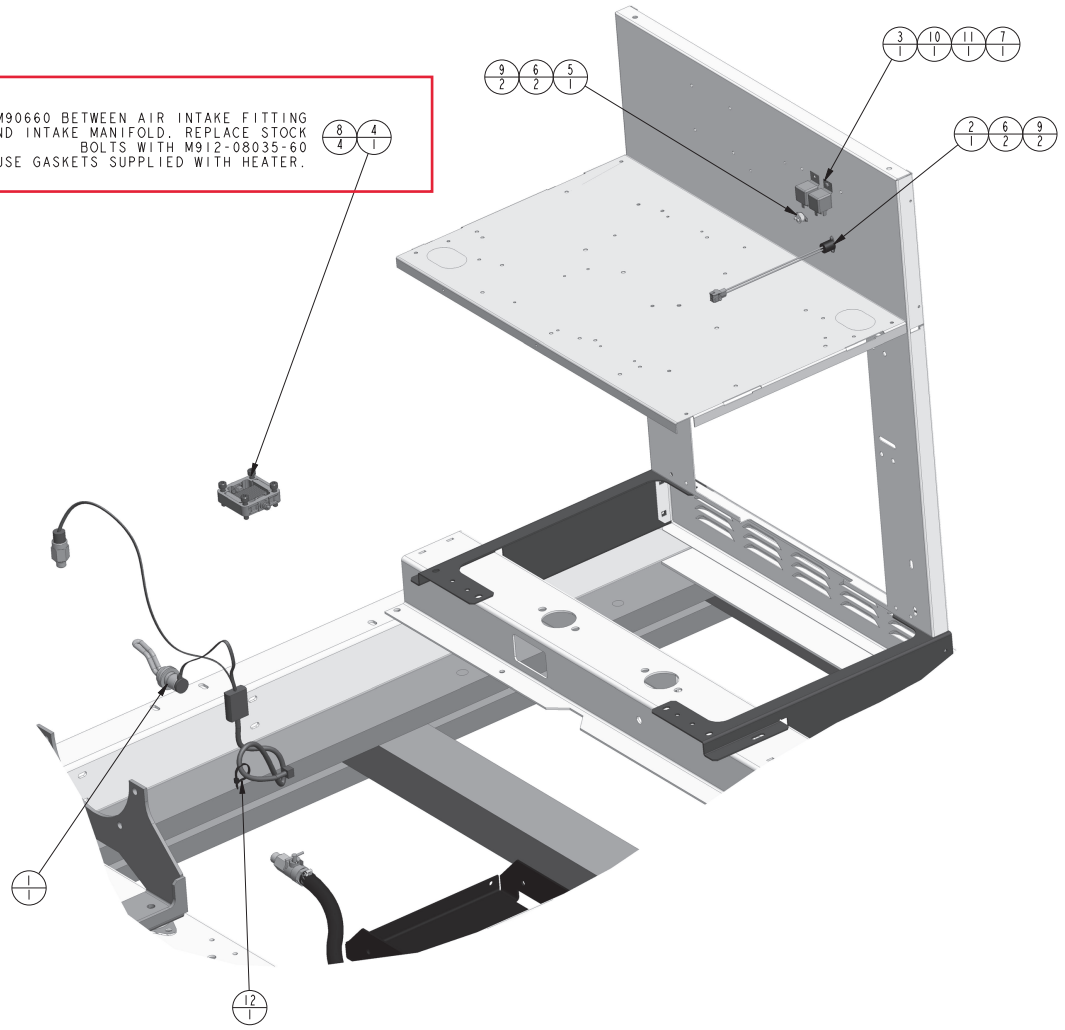
DWG NO. GM102361 | D

40-60KW REOZK AQMD

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM102361-KA2				BLOCK HEATER, 120V, 1000W
	1	GM103076	1	HEATER, BLOCK, 120V 1000W
	2	GM105001	1	SWITCH THERMAL
	3	GM49746	1	RELAY, 12 VDC
	4	GM90660	1	HEATER, MANIFOLD KDI2504M
	5	GM98816	1	ASSEMBLY, TEMPERATURE SWITCH
	6	M7985A-03010-20	4	SCREW, PAN HEAD M3X10
	7	M7985A-04010-20	1	SCREW, PAN HEAD MACHINED
	8	M912-08035-60	4	SCREW, SOCKET HEAD CAP
	9	M934-03-50	4	NUT, HEX 3MM
	10	M934-04-50	1	NUT, HEX 4MM
	11	X-22-7	1	WASHER, LOCK
	12	X-468-1	1	TIE, CABLE

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.

INSTALL GM90660 BETWEEN AIR INTAKE FITTING AND INTAKE MANIFOLD. REPLACE STOCK BOLTS WITH M912-08035-60 USE GASKETS SUPPLIED WITH HEATER.



40-60KW REOZK

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
A	1-24-18	GM102361-KA2 ADDED, SHEET 2 ADDED [CT183674]	CEK
B	4-27-18	(D-8) GM105001 (1) WAS GM94766 (1) ,	
		M7985A-03010-20 (4) WAS (2) , M934-03-50 (4)	
		WAS (2) & M125A-06-80, M6923-06-80,	
		M933-06020-60 REMOVED [CT185140]	SB
C	11-28-18	SHEET 3 ADDED [CT191939]	APB

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH 63 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CEK	1-24-18
CHECKED	CEK	1-24-18
APPROVED	RMF	1-24-18

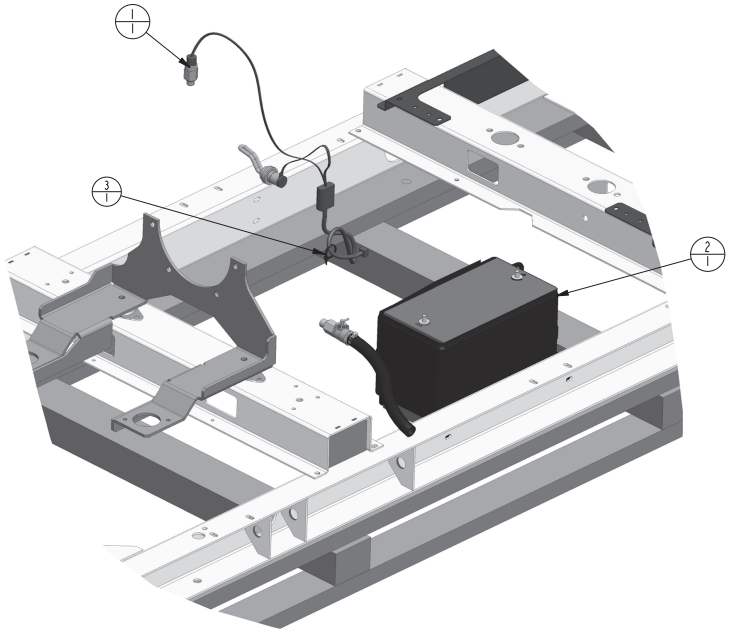
KOHLER.
KOHLER, WISCONSIN 53044

TITLE: DWG, BLOCK HEATER, 120V 1000W

SCALE 0.25 | CAD NO. | SHEET 2 of 3

DWG NO. GM102361 | D

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM102361-KA3				COLD WEATHER PACKAGE
	1	GM103076	1	HEATER, BLOCK, 120V 1000W
	2	GM103784	1	HEATER, BATTERY WRAP 120V, 80W
	3	X-468-1	1	TIE, CABLE
THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.				



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
C	11-28-18	(D-8) GM102361-KA3 ADDED; SHEET 3 ADDED	
		[CT191939]	APB

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 63 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	APB	11-28-18
CHECKED	KJB	11-28-18
APPROVED	JMP	11-28-18

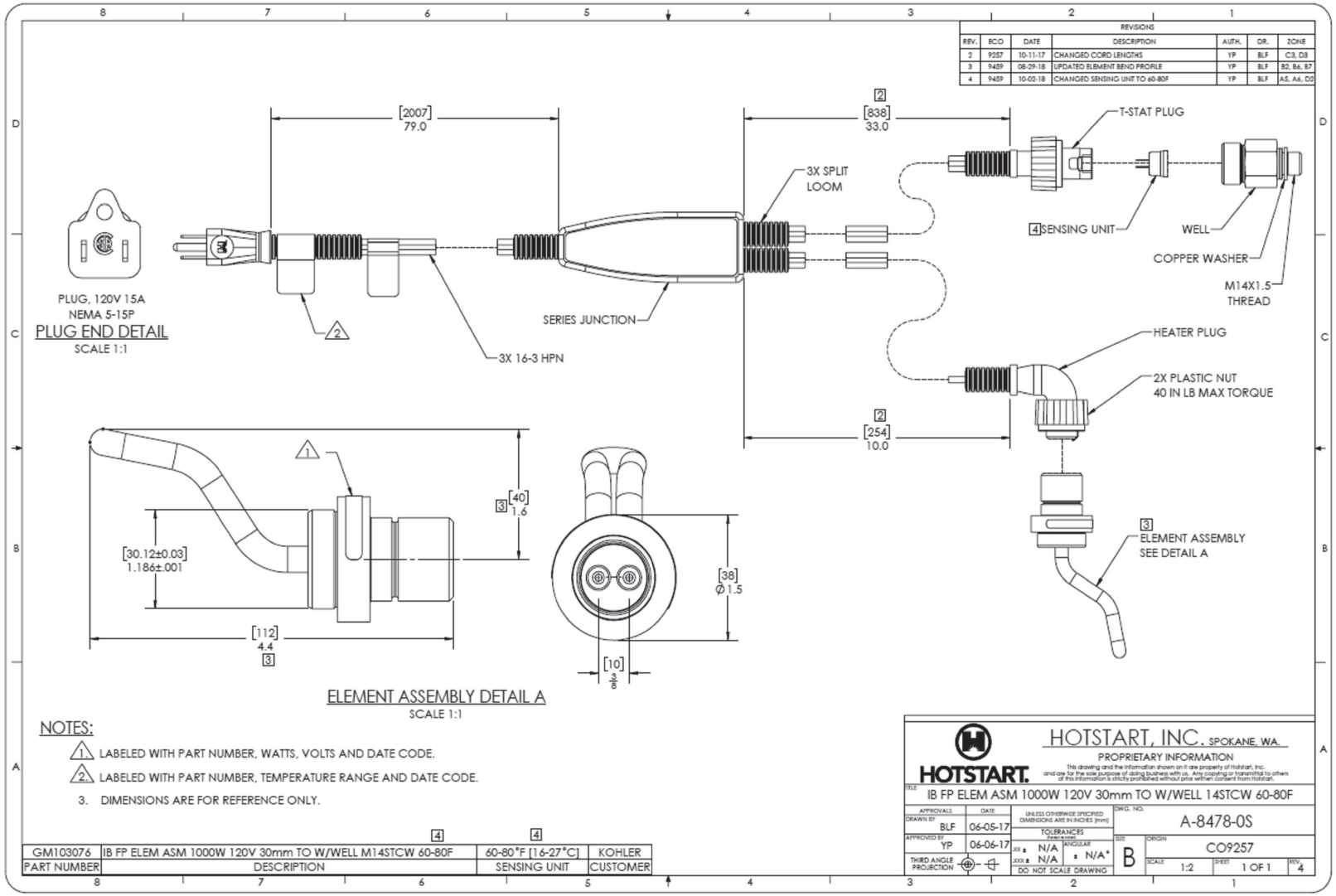
KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DWG, BLOCK HEATER, 120V 1000W

SCALE 0.20 | CAD NO. | SHEET 3 of 3

DWG NO. GM102361 | D

48REOZK4
55REOZT4



REVISIONS						
REV.	ECO	DATE	DESCRIPTION	AUTH.	DR.	ZONE
2	9257	10-11-17	CHANGED CORD LENGTHS	YP	BLF	C3, D3
3	9459	08-29-18	UPDATED ELEMENT BEND PROFILE	YP	BLF	B2, B6, B7
4	9459	10-02-18	CHANGED SENSING UNIT TO 60-80F	YP	BLF	A5, A6, D2

NOTES:

1. LABELED WITH PART NUMBER, WATTS, VOLTS AND DATE CODE.
2. LABELED WITH PART NUMBER, TEMPERATURE RANGE AND DATE CODE.
3. DIMENSIONS ARE FOR REFERENCE ONLY.

GM103076	IB FP ELEM ASM 1000W 120V 30mm TO W/WELL M14STCW 60-80F	60-80°F [16-27°C]	KOHLER
PART NUMBER	DESCRIPTION	SENSING UNIT	CUSTOMER

HOTSTART, INC. SPOKANE, WA.

PROPRIETARY INFORMATION

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TITLE: IB FP ELEM ASM 1000W 120V 30mm TO W/WELL 14STCW 60-80F

DWG. NO. A-8478-0S

APPROVALS	DATE
DRAWN BLF	06-05-17
APPROVED YP	06-06-17
THIRD ANGLE PROJECTION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [mm]

TOLERANCES (Inches) XX ± N/A XXX ± N/A ANGULAR ± N/A°

DO NOT SCALE DRAWING

SIZE B ORIGIN CO9257 SCALE 1:2 SHEET 1 OF 1 REV. 4

▲ DENOTES A CRITICAL CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF CRITICAL CHARACTERISTICS ON THIS DRAWING = 0

◇ DENOTES A MAJOR CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF MAJOR CHARACTERISTICS ON THIS DRAWING = 0

DIMENSIONS ARE REFERENCE ONLY.

PART MAY NOT BE AS PICTURED.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-19-17	NEW DRAWING [173822]	CEK
A	10-10-18	(A-6) 60-80°F [16-27°C] WAS 80-100F (27-38C)	
		[CT190210]	SLR

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: X.XX ± 0.25 X.X ± 1.0 X ± 1.3 ANGLES ± 0°30' SURFACE FINISH 125 MAX.

THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CEK	6-19-17
CHECKED	CEK	6-19-17
APPROVED	RMF	6-19-17

KOHLER. KOHLER, WISCONSIN 53044

TITLE: BLOCK HEATER, 120V, 1000W

SCALE N/A CAD NO. SHEET 1 of 1

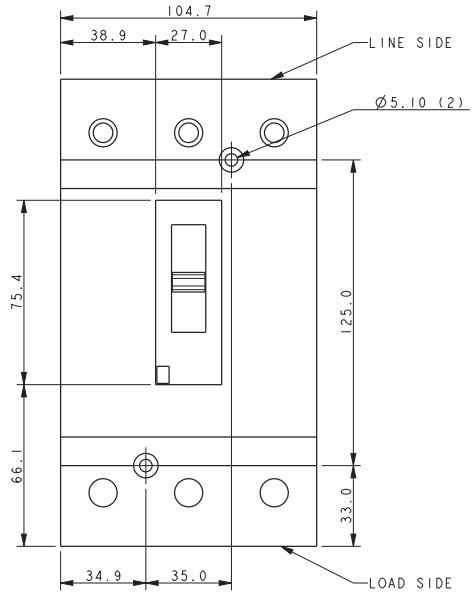
DWG NO. GM103076 D

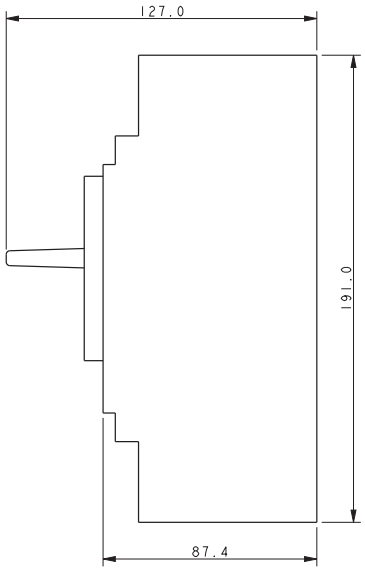
LOMBARDINI 40-60KW

PART NO.	PART REV		DESCRIPTION	AMPS	INTERRUPT kA @480 VAC	CONNECTION TYPE		POLES	RATING	TRIP TYPE	MAG TRIP ONLY		SQUARE D PART NO.
						LINE	LOAD				FULL LOAD AMPS	ADJUSTABLE TRIP RANGE	
GM47476-1	B		BREAKER, CIRCUIT 175A JDL	175	18	AL175JD LUGS	AL175JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDL36175
GM47476-6	C		BREAKER, CIRCUIT 175A JDP		18	TERMINAL NUTS	AL175JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDP36175TX
GM47476-7	C		BREAKER, CIRCUIT 175A JDP		18	TERMINAL NUTS	AL175JD LUGS	3	100%	THERMAL MAGNETIC	-	-	JDP36175CTX
GM47476-27	-		BREAKER, CIRCUIT 175A JDP		18	TERMINAL NUTS	AL175JD LUGS	2	100%	THERMAL MAGNETIC	-	-	JDP26175CTX
GM47476-2	B		BREAKER, CIRCUIT 200A JDL	200	18	AL250JD LUGS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDL36200
GM47476-5	B		BREAKER, CIRCUIT 200A JDP		18	TERMINAL NUTS	AL250JD LUGS	2	100%	THERMAL MAGNETIC	-	-	JDP26200CTX
GM47476-8	C		BREAKER, CIRCUIT 200A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDP36200TX
GM47476-9	C		BREAKER, CIRCUIT 200A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	THERMAL MAGNETIC	-	-	JDP36200CTX
GM47476-3	B		BREAKER, CIRCUIT 225A JDL	225	18	AL250JD LUGS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDL36225
GM47476-10	C		BREAKER, CIRCUIT 225A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDP36225TX
GM47476-11	C		BREAKER, CIRCUIT 225A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	THERMAL MAGNETIC	-	-	JDP36225CTX
GM47476-4	B		BREAKER, CIRCUIT 250A JDL	250	18	AL250JD LUGS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDL36250
GM47476-12	C		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	THERMAL MAGNETIC	-	-	JDP36250TX
GM47476-13	C		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	THERMAL MAGNETIC	-	-	JDP36250CTX
GM47476-14	C		BREAKER, CIRCUIT 250A JJP		65	TERMINAL NUTS	AL250JD LUGS	3	-	MAGNETIC ONLY	114-217	684-2500	JJP36250M75TX
GM47476-15	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 3.2 LI	-	-	JDP36250U3IXTX
GM47476-16	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 3.2S LSI	-	-	JDP36250U33XTX
GM47476-17	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 6.2A LSIG	-	-	JDP36250U44XTX
GM47476-18	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 3.2 LI	-	-	JDP36250CU3IXTX
GM47476-19	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 3.2S LSI	-	-	JDP36250CU33XTX
GM47476-20	-		BREAKER, CIRCUIT 250A JDP		18	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 6.2A LSIG	-	-	JDP36250CU44XTX
GM47476-21	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 3.2 LI	-	-	JGP36250U3IXTX
GM47476-22	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 3.2S LSI	-	-	JGP36250U33XTX
GM47476-23	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	80%	MICROLOGIC 6.2A LSIG	-	-	JGP36250U44XTX
GM47476-24	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 3.2 LI	-	-	JGP36250CU3IXTX
GM47476-25	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 3.2S LSI	-	-	JGP36250CU33XTX
GM47476-26	-		BREAKER, CIRCUIT 250A JGP		35	TERMINAL NUTS	AL250JD LUGS	3	100%	MICROLOGIC 6.2A LSIG	-	-	JGP36250CU44XTX

▲ DENOTES A CRITICAL CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF CRITICAL CHARACTERISTICS ON THIS DRAWING = 0

◇ DENOTES A MAJOR CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF MAJOR CHARACTERISTICS ON THIS DRAWING = 0





CONNECTION CHART		
CONNECTION TYPE	CONNECTION (PER PHASE)	TORQUE
AL175JD LUGS	(1) #4-4/0 AL/CU	25 Nm [225 IN-LB]
AL250JD LUGS	(1) 3/0-350 KCMIL AL/CU	25 Nm [225 IN-LB]
TERMINAL NUTS	(1) M8	9-10.2 Nm [80-90 IN-LB]

NOTE: 2-POLE BREAKERS HAVE AN UNPOPULATED CENTER POLE.

KOHLER PART NUMBER TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

SQUARE D J-FRAME
600V

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
B	11-16-10	REDRAWN IN PRO-E & CHART UPDATED, GM47476-5 ADDED; [90604-1]	BTW
C	1-6-11	GM47476-6 THRU -14 ADDED [90647-15]	WSD
D	4-13-12	GM47476-15 THRU -26 ADDED; (A-1) GM47476-CMP WAS GM47476 [CT14516]	WSD
E	12-6-13	(D-8) GM47476-27 ADDED [CT66339]	WSD
F	10-24-17	UPDATE LOAD CONNECTION TEXT FOR 100% LCBS FROM CU TO AL; (B-8) CU250 LUGS REMOVED FROM CHART [CT180597]	WSD

UNLESS OTHERWISE SPECIFIED: (1) DIMENSIONS ARE IN MILLIMETERS (2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' — SURFACE FINISH 3.2 MAX. — THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	RAC	10-21-05
CHECKED	JMS	6-13-06
APPROVED	SLJ	6-15-06

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DWG, CIRCUIT BREAKER

SCALE | CAD NO. | SHEET 1 of 1

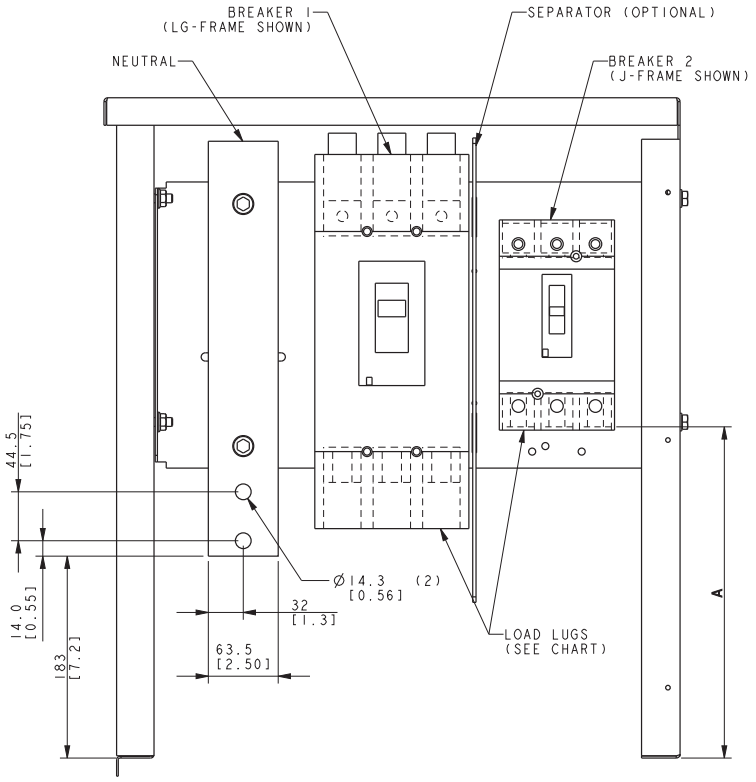
DWG NO. GM47476-CMP | D

AL/CU MECHANICAL LOAD LUGS PER PHASE			A
BREAKER FRAME	AMPS	WIRE RANGE	WIRE BENDING SPACE
H	15-150	(1) #14 TO 3/0	315 [12.4]
J	175	(1) 1/0 TO 4/0	301 [11.9]
	200-250	(1) 3/0 TO 350 KCMIL	
LA	300-400	(1) #1 TO 600 KCMIL OR (2) #1 TO 250 KCMIL	254 [10.0]
LG	400	(2) 2/0 TO 500 KCMIL AL/CU	250 [9.8]
MECHANICAL LOAD LUGS INCLUDED WITH H, J & LG LSIG NEUTRALS			
H	60-150	(1) #14 TO 3/0 AWG AL/CU	
J	250	(1) 3/0 TO 350 KCMIL AL/CU	
LG	400	(2) 4/0 TO 500 KCMIL AL/CU	

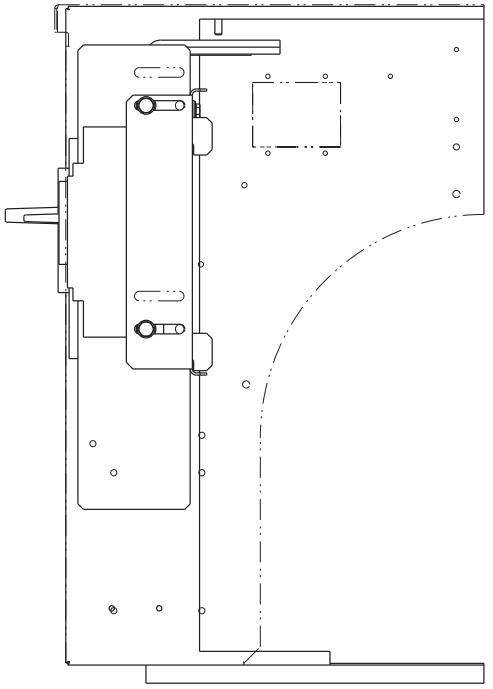
STANDARD BREAKER COMBINATIONS		
BREAKER 1	BREAKER 2	TRIP TYPE
H OR J	-	ALL
LA	-	ALL
LG	-	ALL
H OR J	H OR J	NO LSIG
LA	H OR J	NO LSIG
LG	H OR J	NO LSIG
LG	LG	NO LSIG

NOTES:

1) SEE UNIT DIMENSION PRINT (ADV-XXXX) FOR ADDITIONAL DIMENSIONS, JUNCTION BOX AND STUB-UP LOCATION.
2) ADD SKID DEPTH TO WIRE BENDING HEIGHTS ON THIS PRINT TO ARRIVE AT FULL WIRE-BENDING SPACE.
3) CONSULT FACTORY FOR BREAKER COMBINATIONS NOT SHOWN ON THIS PRINT.
4) MECHANICAL LUGS ARE AVAILABLE FOR NON-LSIG NEUTRAL. SEE ADV-7376. LSIG NEUTRALS INCLUDE LUGS (SEE CHART).
5) NEUTRALS ARE BONDED TO GROUND AS STANDARD. CONSULT LOCAL CODES OR SYSTEM REQUIREMENTS.
6) CIRCUIT BREAKER FRAMES REFER TO STANDARD SQUARE-D PRODUCT.
7) STANDARD NEUTRALS PROVIDED ARE SIZED FOR MAXIMUM UNIT AMPS. LSIG NEUTRALS ARE MATCHED TO THEIR CIRCUIT BREAKER AMPS.
8) DIMENSIONS ARE MM, DIMENSIONS IN [ ] ARE INCHES.



RIGHT SIDE SHOWN WITH COVERS REMOVED



VIEW FROM ENGINE END
(HALF VIEW SHOWN)

ELECTRONIC TRIP UNITS		
FRAME	TRIP UNIT	
H	LI	MICROLOGIC 3.2
	LSI	MICROLOGIC 3.2S
	LSIG	MICROLOGIC 6.2A
J	LI	MICROLOGIC 3.2
	LSI	MICROLOGIC 3.2S
	LSIG	MICROLOGIC 6.2A
LG	LI	MICROLOGIC 3.3
	LSI	MICROLOGIC 3.3S
	LSIG	MICROLOGIC 6.3A

UL INTERRUPT kA RATINGS			
BREAKER	∘ 240V	∘ 480V	∘ 600V
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18

LINE CIRCUIT BREAKER (LCB) KITS
4P/4PX/4Q/4QX ALTERNATOR FRAME STYLES

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	5-16-07	NEW DRAWING [79677]	WSD
A	9-7-07	(D-6) D WITH D COMBINATION ADDED [83718]	WSD
B	4-22-08	(D-8) 15-150 WAS 40-150 [84767]	WSD
C	10-19-12	UPDATED D TO LG, 100% H/J ADDED, LA ADDED, LSIG NEUTRAL LUG CHART ADDED [CT26372]	WSD
D	11-2-16	(D-8) REMOVED SEPARATE LINES FOR H & J 100% LUGS; (D-4) CLARIFIED TRIP TYPES [CT114236]	WSD
E	3-26-19	(A-7) LA FRAME INTERRUPTS ADDED [CT194577]	WSD

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

THIRD-ANGLE PROJECTION

APPROVALS		DATE
DRAWN	WSD	5-16-07
CHECKED	WSD	5-16-07
APPROVED	AJH	5-16-07

KOHLER
KOHLER, WISCONSIN 53044

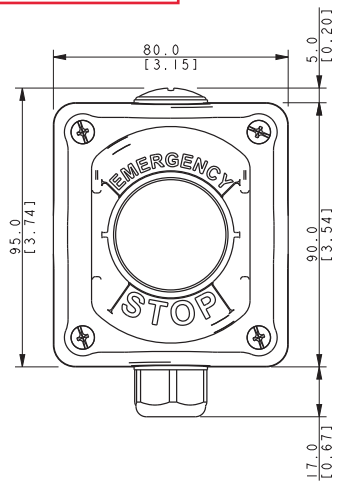
TITLE: PRINT, DIMENSION

SCALE 0.45 | CAD NO. | SHEET 1 of 1

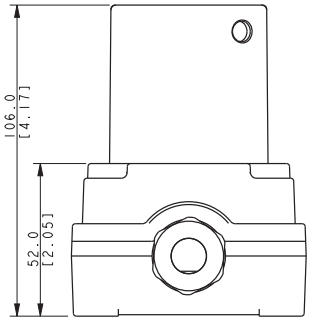
DWG NO. ADV-7370 | D

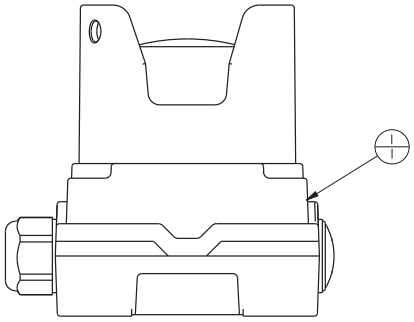
KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM103743				E-STOP, NEC REMOTE
	1	GM103743-1	1	E-STOP W/ YELLOW SHROUD, LOTO
	2	GM103743-2	4	#10 X 1.25□ Sheetmetal Screw
	3	GM103743-3	1	TERMINAL, FAST-ON, MALE, 18-22 AWG
	4	GM103743-4	1	TERMINAL, FAST-ON, FEMALE, 18-22 AWG
	5	GM103743-5	2	TERMINAL, SPADE, 22-16 AWG
	6	GM103743-6	1	LITERATURE, TT-1736

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.



SCALE 1.50





NOTE:

DIMENSIONS IN [ ] ARE IN INCH EQUIVALENTS.

SCREWS AND TERMINALS ARE TO BE BAGGED AND PLACED IN THE BOX

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-12-18	NEW DRAWING [CT176728]	CCL

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 32 MAX.
THIRD ANGLE PROJECTION

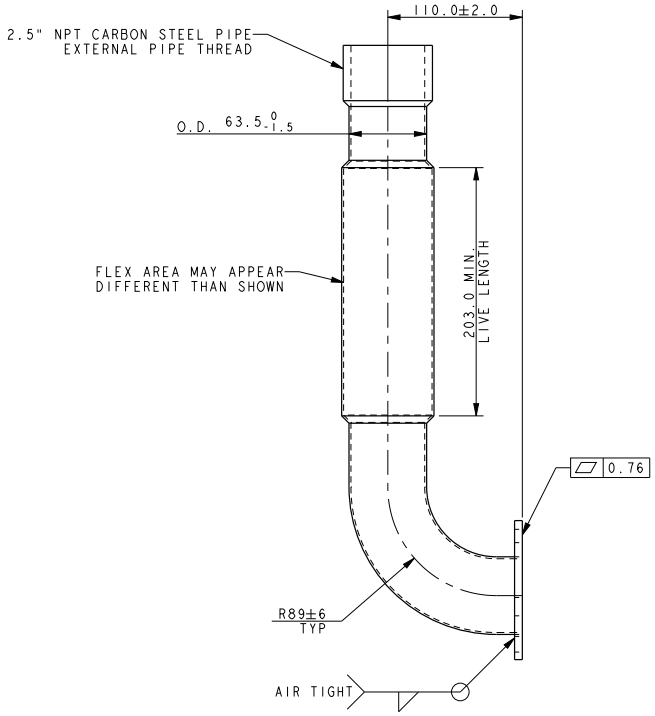
APPROVALS		DATE
DRAWN	CCL	2-12-18
CHECKED	KJB	2-12-18
APPROVED	KJB	2-12-18

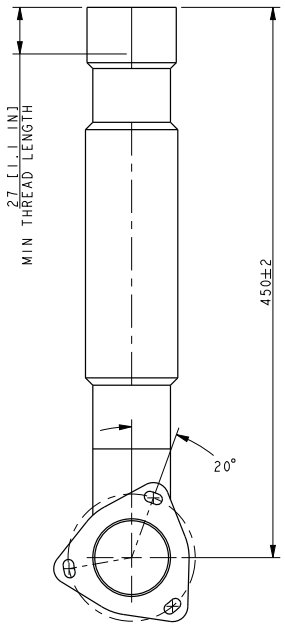
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

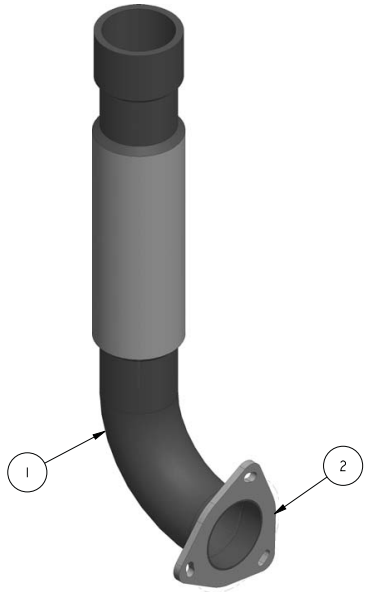
TITLE: E-STOP, NEC REMOTE

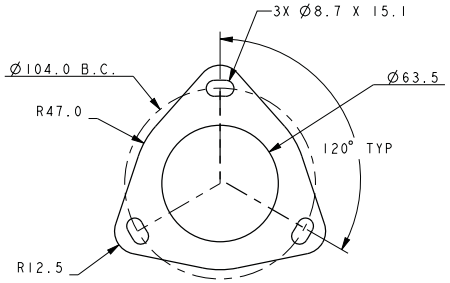
SCALE 1.50 | CAD NO. | SHEET 1 of 1

DWG NO. GM103743 | D









ITEM 2

SCALE 0.750

NOTE:

MUST BE FREE OF RUST & BURRS.

ALL WELDS MUST BE AIR TIGHT.

MATERIAL: TWO PLY BELLOWS, SERIES 320 STAINLESS STEEL, THICKNESS 0.26.PER PLY. END CONSTRUCTION WELDED. INTERNAT & EXTERNAL BRAIDING - 304 STAINLESS STEEL. USE 16 GA [.065 IN.] ALUMINIZED STEEL TUBE.

ITEM	QTY	DESCRIPTION
2	1	6.35 [0.250 IN] CRS
1	1	16 GA [.065 IN] ALUMINIZED STEEL TUBE

40-60 KW
KOHLER DIESEL

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-30-14	NEW DRAWING [CT81894]	CEK
A	11-6-14	ITEM 3 REMOVED, Ø8.7 X 15.1 WAS Ø9.0, WELDED FLANGE WAS FLOATING [CT98685]	CEK

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	CEK	6-30-14
CHECKED	CEK	6-30-14
APPROVED	BMK	6-30-14

KOHLER CO. METRIC | PRO-E

POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

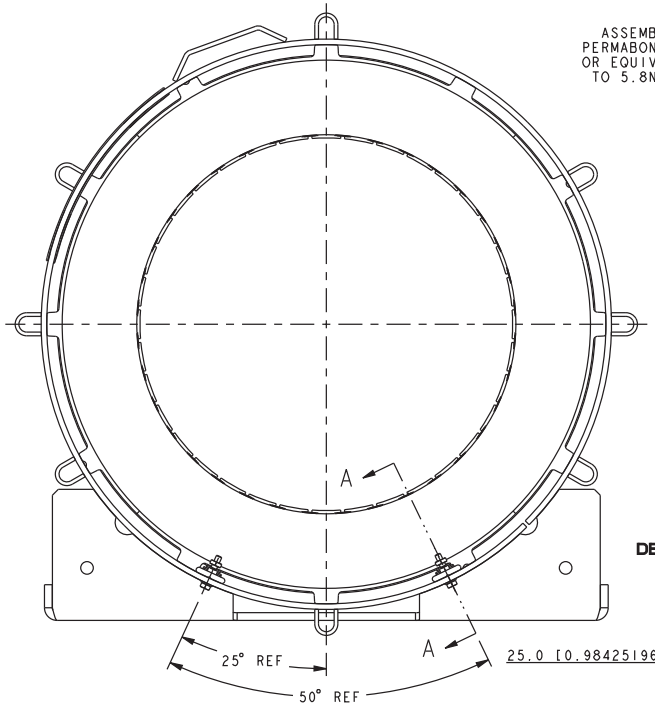
TITLE: **TUBE, FLEX EXHAUST**

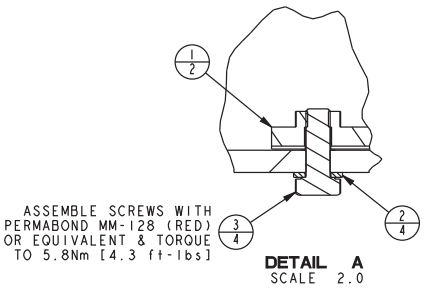
SCALE 0.5 | CAD NO. | SHEET 1 of 1

DWG NO. **GM94034** | **D**

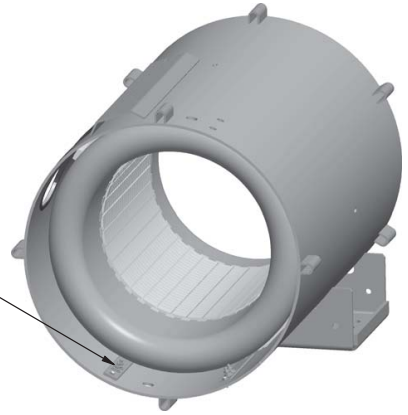
ITEM	PART NO	QTY	DESCRIPTION
1	GM79574	2	HEATER, STRIP 120V, 100W
2	M125A-05-80	4	WASHER, PLAIN
3	M933-05014-60	4	SCREW, HEX CAP

AUTOMATED TABLE - ALL UPDATES MUST BE MADE IN THE FAMILY TABLE OF THE GENERIC ASSEMBLY





DETAIL A
SCALE 2.0



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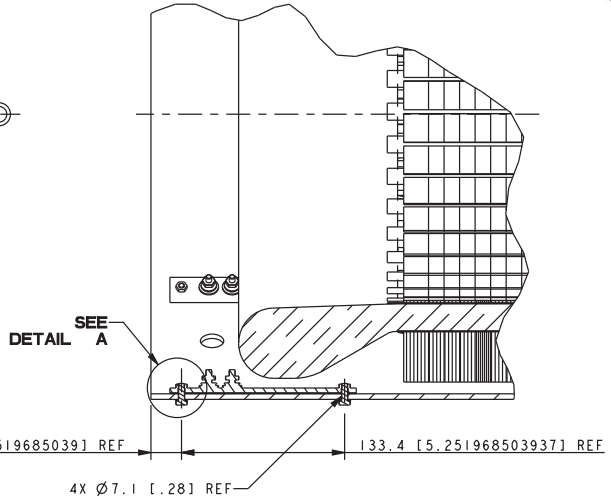
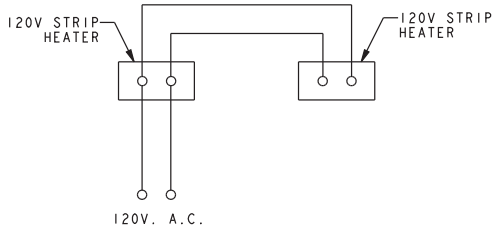
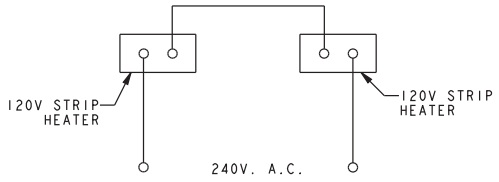


SECTION A-A



120V. CONNECTION DIAGRAM



240V. CONNECTION DIAGRAM

NOTE:

1) FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE
2) DIMENSIONS IN [ ] ARE INCH EQUIVALENTS
3) SIMILAR TO 253213

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	11-17-10	NEW DRAWING [90603-7]	DFH
A	5-10-11	(D-8) M933-05014-60 (4) WAS M933-05020-60 (4) [91623]	DFH
B	6-3-11	(D-4) ft-lbs WAS IN-LBS IN TORQUE NOTE [91703]	SDS

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30' SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

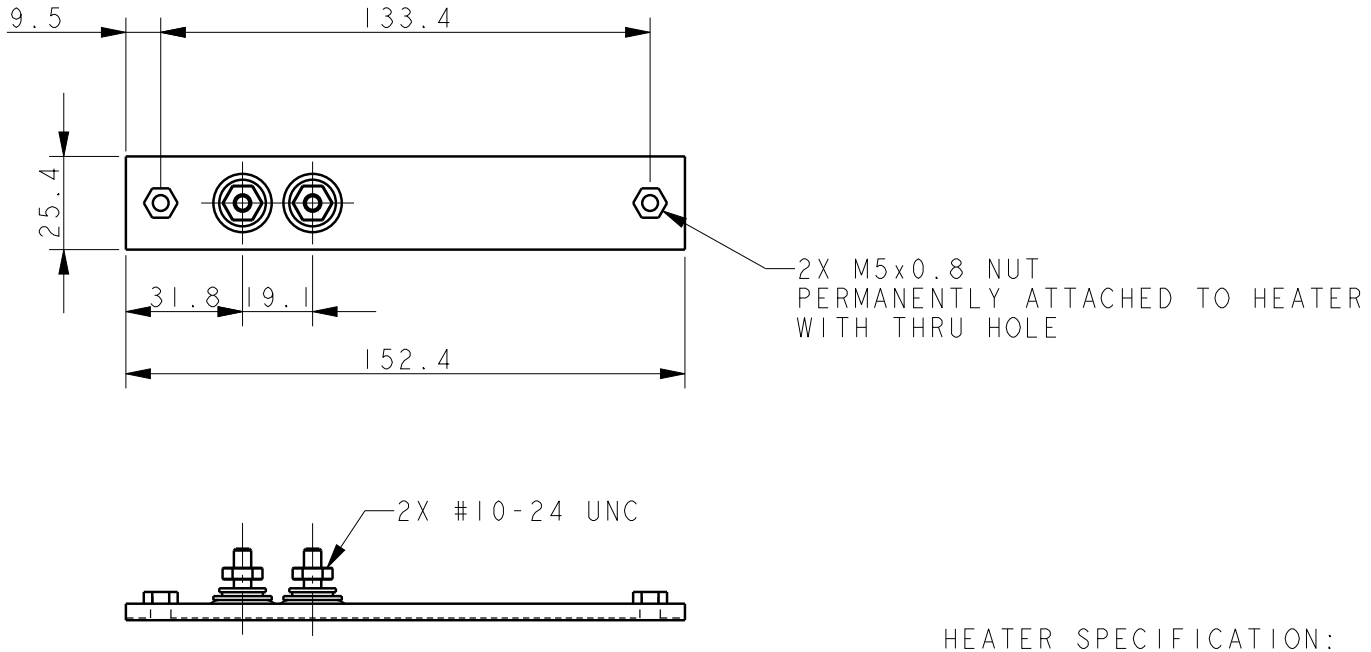
APPROVALS		DATE
DRAWN	DFH	11-17-10
CHECKED	AML	11-17-10
APPROVED	RVM	11-17-10

TITLE: DWG, ASSY GENERATOR HEATER

SCALE 0.50 | CAD NO. | SHEET 1 of 1

DWG NO. GM79104 | D

GM79104-KA1
GENERATOR HEATER
110/120-220/240V, 200W



NOTE:

SIMILAR TO 291269

HEATER SPECIFICATION:
100 WATT / 120 VOLT

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	1-5-11	NEW DRAWING [90603-7]	DFH

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DFH	1-5-11
CHECKED	PLD	1-5-11
APPROVED	AML	1-5-11

KOHLER CO. METRIC PRO-E

POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE

HEATER, STRIP

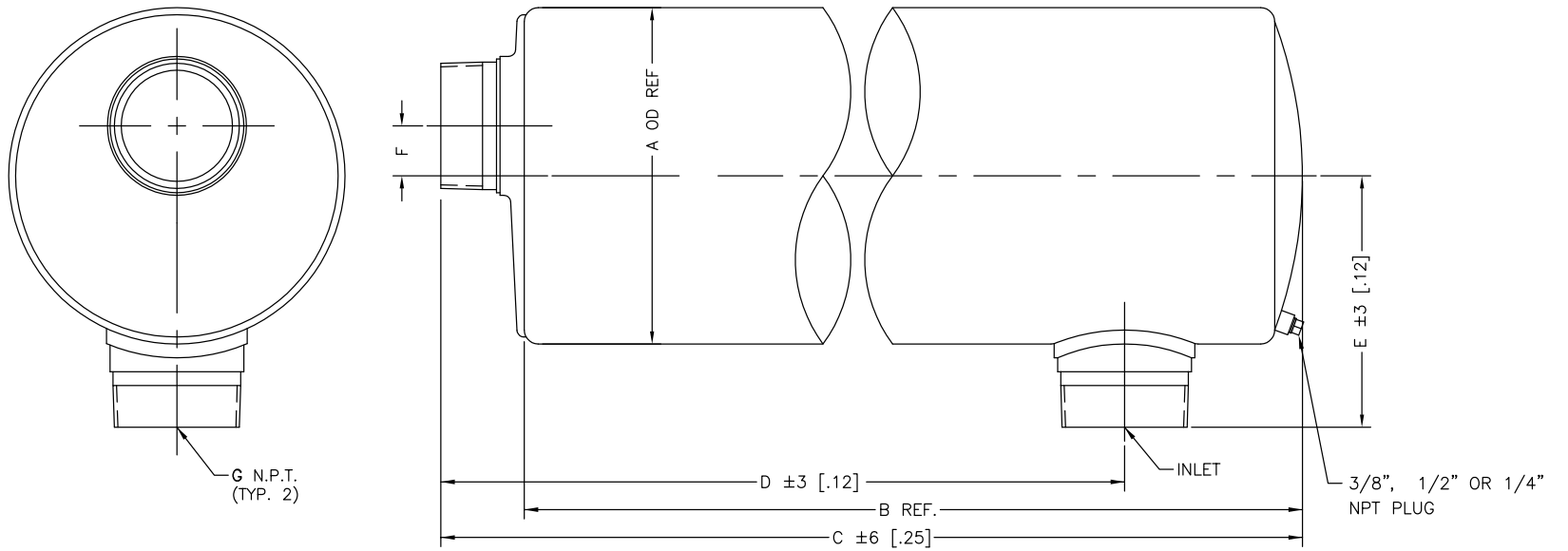
SCALE 0.75 | CAD NO. | SHEET 1 of 1

DWG NO. GM79574 B

PART NO.	REV	TYPE	A OD	B	C	D	E	F	G	DRAIN PLUG REQUIRED
253236	W	CRITICAL	216 [8.5]	879 [34.6]	922 [36.3]	810 [31.9]	178 [7.00]	0	3" N.P.T.	NO
273720	W	CRITICAL	307 [12.1]	1471 [57.9]	1547 [60.9]	1410 [55.5]	230 [9.05]	46 [1.8]	4" N.P.T.	YES
276257	W	CRITICAL	229 [9.0]	1011 [39.8]	1062 [41.8]	975 [38.4]	165 [6.5]	0	2" N.P.T.	YES
273718	W	INDUSTRIAL	216 [8.5]	777 [30.6]	853 [33.6]	757 [29.8]	184 [7.25]	0	3" N.P.T.	NO
273719	W	INDUSTRIAL	229 [9.0]	808 [31.8]	884 [34.8]	759 [29.9]	191 [7.50]	0	4" N.P.T.	YES
276256	W	INDUSTRIAL	193 [7.6]	574 [22.6]	625 [24.6]	541 [21.3]	147 [5.80]	0	2" N.P.T.	YES
352647	W	CRITICAL	282 [11.1]	1270 [50.0]	1341 [52.8]	1227 [48.3]	217 [8.55]	0	3" N.P.T.	YES
GM10078	W	RESIDENTIAL	257 [10.1]	970 [38.2]	1044 [41.1]	940 [37.0]	205 [8.1]	46 [1.8]	3" N.P.T.	YES
GM10079	W	RESIDENTIAL	257 [10.1]	1250 [49.2]	1323 [52.1]	1194 [47.0]	205 [8.1]	0	4" N.P.T.	YES
GM32151	W	HOSPITAL	358 [14.1]	1689 [66.5]	1758 [69.2]	1610 [63.4]	257 [10.1]	120 [4.0]	4" N.P.T.	YES
GM71675	X	CRITICAL	203 [8.0]	–	1032 [40.6]	845 [33.3]	178 [7.0]	0	3" N.P.T.	YES

REV	DATE	REVISION	BY
T	4-7-99	(C-4) GM10078, & GM10079 ADDED, (A-1) METRIC DWG WAS ENGLISH	
		[55962]	SAM
U	8-6-99	(D-2) DRAIN PLUG REQ FOR 253236 & 273718 REMOVED (A-3) DRAIN	
		PLUG NOTE MOVED TO CHART [59416]	SAM
V	10-29-03	(D-4) GM32151 ADDED [70740]	SAM
W	4-24-06	(A-3) "OR ALUMINUM" REMOVED FROM COLOR NOTE [77167]	SAM
X	1-6-10	(D-4) GM71675 ADDED (B-1) 1/4" NPT ADDED [88561]	SAM

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.



METRIC CAD FILE

SILENCER IS TO BE SUPPLIED PACKED SEPARATELY IN A CORRUGATED CARTON SUITABLE FOR INDIVIDUAL RESHIPMENT OF SILENCER.

COLOR HIGH TEMP BLACK

DIMENSIONS IN [ ] ARE INCH EQUIVALENTS.

MATERIAL: ALUMINIZED STEEL

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN DR	12-1-82
CHECKED EB	12-10-82
APPROVED LW	12-10-82
PLOTTED DATE	

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: SILENCER

SCALE 0.4X | CAD NO. 253236.DWG | SHEET 1-1

DWG. NO. 253236 | C

2.5.2 Biodiesel fuel

- Fuels containing 10% methyl ester or B10, are suitable for use in this engine provided that they meet the specifications listed in the **Tab. 2.3**.
- **DO NOT USE** vegetable oil as a biofuel for this engine.

Tab. 2.3

FUEL COMPATIBILITY								
	Compatible		**Warranty coverage**		**Engine waste**		**Certification emission**	
	yes	no	yes	no	yes	no	yes	no
EN 590, DIN 51628 - Military NATO fuel F-54 (S=10 ppm)								
Bio Fuels (EN14214)	(4)		(4)			(4)	(4)	
ARCTIC (EN 590/ASTM D 975)	(2)							
No 1 Diesel (US) - ASTM D 975 - Grade 1-D S 15 (S=15 ppm)								
No 1 Diesel (US) - ASTM D 975 - Grade 1-D S 500 (S=500 ppm)			(1)			(1)		
No 2 Diesel (US) - ASTM D 975 - Grade 2-D S 15								
No 2 Diesel (US) - ASTM D 975 - Grade 2-D S 1500			(1)			(1)		
High sulfur fuel < 5000 ppm (<0.5%)			(1)			(1)		
High sulfur fuel > 5000 ppm (<0.5%)			(3)			(3)		
High sulfur fuel > 10000 ppm (>1%)								
Civil Jet Fuels Jet A/A1								
Civil Jet Fuels Jet B								

(1) Except for catalyst clogged and EGR.

(2) Without adding oil.

(3) Except for catalyst clogged and EGR. Shorter oil change intervals.

(4) Max. 10% in fuel.

GLOBAL POWER COMPONENTS™
EVERYTHING BUT THE GENERATOR™

Steel Paint Finish Specification

Test Results:

Corrosion Resistance (ASTM B-117): 3000 Hours

- Salt Spray:
  - Corrosion Creep (ASTM D1654) – 4A
  - Scribe Blisters (ASTM D714) – 8M /6F
  - Face Blisters (ASTM D714) – 8MD / 6M
  - Edge Blisters (ASTM D714) – 8M / 6M

Humidity Resistance (ASTM 2247): 3000 Hours

- Cross Hatch Adhesion:
  - 24 Hour Recovery Adhesion (ASTM D3359) – 98% / 4B

UV Resistance (ASTM D4587): 1000 Hours

- QUV B Bulb:
  - 60° Gloss Retention (ASTM D523): 90.6%
  - ΔE: 3.6

Select Chemical Resistance: The following chemicals had no effect (24-hour watch glass)

- Sodium Hydroxide
- Sulphuric Acid
- Acetic Acid (20%)
- Diesel Fuel
- Nitric Acid
- Hydrochloric Acid
- Water
- Citric Acid (50%)
- Hydraulic Oil
- Phosphoric Acid

Preparation and Application:

Exterior Surfaces

- Clean exterior surfaces to SSPC-SP3
- Clean exterior surfaces to SSPC-SP10
- Primer
  - Apply HSP-2128 Polyurethane Primer – DFT 1.7 – 2.2 mil
- Finish – High Solids Polyurethane
  - Apply AUE-280 Polyurethane Topcoat – DFT 1.7 to 2.2 mils

ASTM D3359 – Method B (Cross-Hatch Adhesion Ratings)	
Adhesion	**Rating**
100%	5B
95 – 99%	4B
85 – 94%	3B
65 – 84%	2B
35 – 64%	1B
≤ 34%	0B

ASTM D1654 – Method A (Corrosion Creep At Scribe)	
Corrosion Undercutting in Millimeters	**Rating**
0	10A
0 → 0.5	9A
0.5 → 1.0	8A
1.0 → 2.0	7A
2.0 → 3.0	6A
3.0 → 5.0	5A
5.0 → 7.0	4A
7.0 → 10.0	3A
10.0 → 13.0	2A
13.0 → 16.0	1A
> 16.0	0A

ASTM D714 –Blisters	
Size 8 is the smallest and size 2 is the largest	
Rating	**Description**
D	Dense blisters
MD	Medium dense blisters
M	Medium blisters
F	Few blisters

FPI SENSORS INTERNATIONAL

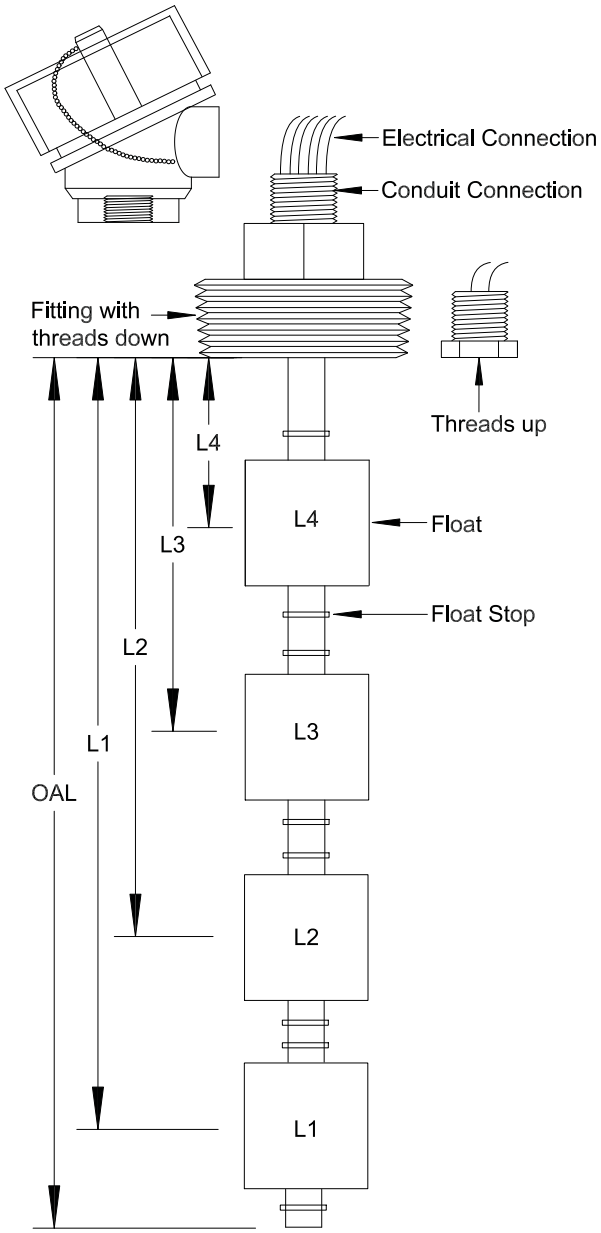
A HIGHER LEVEL OF SATISFACTION

Four Level Configurator – Build to Order

We excel in LOW COST » HIGH QUALITY » 72 HOUR MFG TIME

WE SHIP IN 72 HOURS — FPI SENSORS INTERNATIONAL — CUSTOM ORDERS

MANY OTHER VARIATIONS AND OPTIONS ARE AVAILABLE



HOUSING:
❑ Nema 4X Explosion Proof ❑ Watertight ❑ NA

ELECTRICAL CONNECTION:
❑ Wire ❑ Cable ❑ Connector (specify) _____

CONDUIT CONNECTION:
❑ ½" NPT ❑ Other _____ ❑ NA

FITTING AND STEM MATERIAL:
❑ SS ❑ Brass ❑ PVC ❑ Poly ❑ Teflon

FITTING SIZE (NPT):
❑ ¼" ❑ ½" ❑ ¾" ❑ 1" ❑ 1¼" ❑ 1½" ❑ 2"
❑ Flange _____ ❑ Other _____

THREAD ORIENTATION:
❑ Threads down *(threads from outside of the tank)*
❑ Threads up *(threads from inside of the tank)*

LEAD LENGTH: _____"

FLOAT STOPS:
❑ Retaining ring ❑ Set collar

FLOAT MATERIAL:
❑ SS ❑ Buna ❑ Poly ❑ Teflon ❑ PVC

SWITCH TYPE:
❑ SPST ❑ SPDT

SWITCH RATING:
❑ 10 watt (500ma) ❑ 50 watt (1 amp) ❑ 100 watt (3 amp)

ACTUATION:	OPERATION:	SPECIFIC GRAVITY:
L4 _____"	❑ N.O. ❑ N.C	❑ .60sg ❑ .93sg
L3 _____"	❑ N.O. ❑ N.C.	❑ .60sg ❑ .93sg
L2 _____"	❑ N.O. ❑ N.C.	❑ .60sg ❑ .93sg
L1 _____"	❑ N.O. ❑ N.C.	❑ .60sg ❑ .93sg

Minimum actuation is 1" Maximum actuation is 235"

OPTIONS:
❑ Shroud
❑ Field Adjustable Length
❑ Thermocouple _____
❑ Temp Switch ❑ N.O. or ❑ N.C. _____ °F set point
❑ Centering Disk
❑ Compression Union
❑ Thermistor _____

1.800.852.9984

www.FPIsensors.com

info@FPIsensors.com

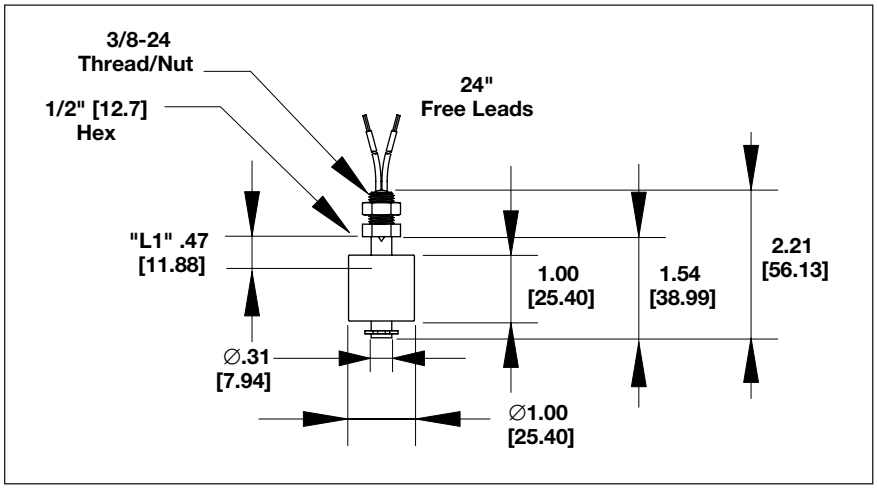
Fax 651.681.1888

L003 Series

Compact, Low-Cost Switches – Ideal for High Volume Use

Key Features:

- Ideal for shallow tanks
- Broad media compatibility
- Selectable to Normally-Open or Normally-Closed operation by inverting the float
- 50 VA switch (standard)

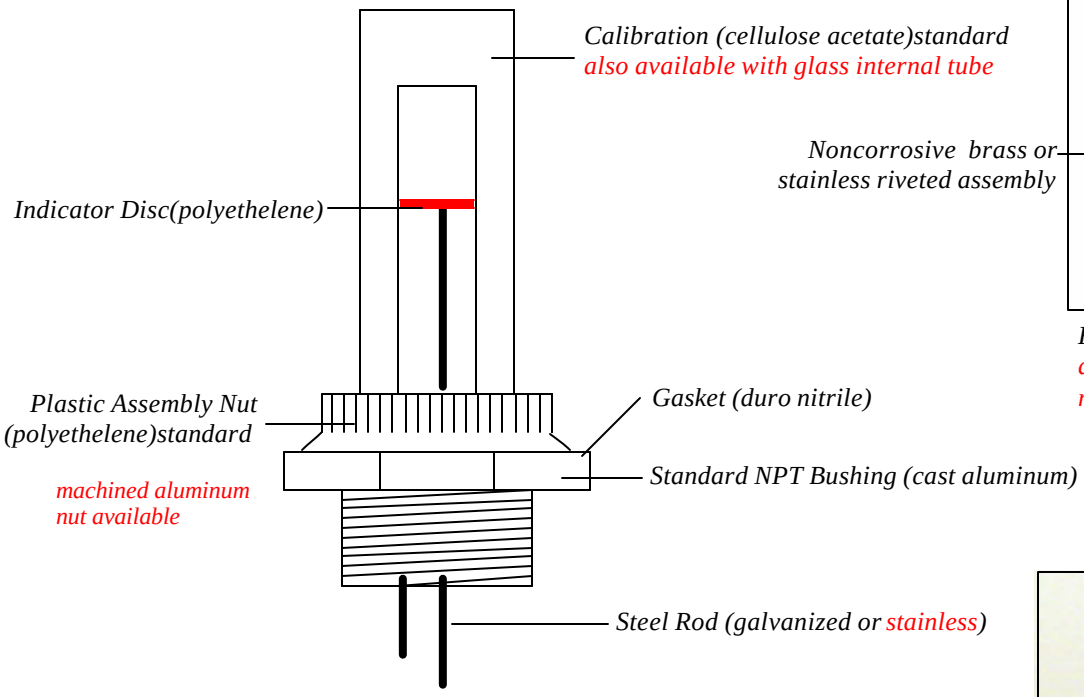


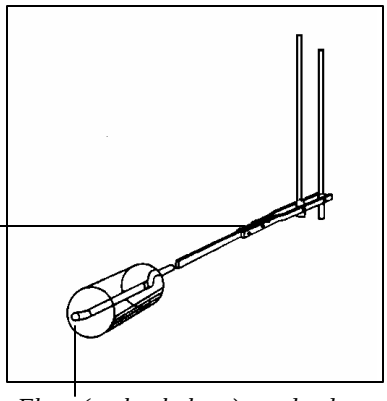
Series	Mounting	Stem/Float Materials	SG	Temperature	Pressure	P/N
L003 **Compact, Low-Cost Switches**	⅛" NPT	Solid/PP	.90	-40° to +150° F	150 PSIG	L003-0102-0303
	⅜"-24	Solid/PP	.90	-40° to +150° F	150 PSIG	L003-1802-0303
	⅛" NPT	Hollow/PP	.70	-40° to +150° F	50 PSIG	L003-0102-0203
	⅜"-24	Hollow/PP	.70	-40° to +150° F	50 PSIG	L003-1802-0203
	⅛" NPT	PVC/PVC	.90	-40° to +140° F	50 PSIG	L003-0105-0503
	⅜"-24	PVC/PVC	.90	-40° to +140° F	50 PSIG	L003-1805-0503
	⅛" NPT	PVDF/PVDF	1.0	-40° to +150° F	50 PSIG	L003-0104-0403
	⅜"-24	PVDF/PVDF	1.0	-40° to +150° F	50 PSIG	L003-1804-0403
	⅛" NPT	Nylon/Buna	.80	-40° to +150° F	150 PSIG	L003-0118-2003
	⅜"-24	Nylon/Buna	.80	-40° to +150° F	150 PSIG	L003-1818-2003

THE AT -A- GLANCE™

Direct Reading Gauge

One of the Industry's Most Popular Gauges





The At-A-Glance Type D Gauge is a reliable, swing arm type gauge used for measuring all types of liquid levels. Its simple mechanical design promotes durability, minimal upkeep, and easy/ inexpensive repairs. With its many available options (see page 6) it is a versatile and inexpensive solution to all of your tank monitoring needs.

- **Available with optional ALARM (see page 17)**

KRUEGER SENTRY GAUGE

KRUEGER SENTRY GAUGE CO. INC.
1873 Siesta Lane: Green Bay, WI 54313-8021
Phone:(920) 434-8860 : Fax (920) 434-8897
Office Hours: 7:00 A.M. to 5:00 P.M. (CST)
http://www.kruegersentrygauge.com

THE AT -A- GLANCE

Direct Reading Gauge

A. **CALIBRATION ASSEMBLY:** Inner and outer plastic housings with printed calibration paper between housings. Withstands up to 70 PSI. (**options**-glass inner piece)

B. **INDICATOR DISC:** Red HDPE plastic

C. **LOCK NUT:** Red plastic to hold calibration assembly in place. (**options**-aluminum lock nut)

D. **DURO NITRILE GASKET:** On which flanges on base of calibration assembly are firmly seated to prevent leakage. (**options**-viton gasket)

E. **ALUMINUM DIE CAST BUSHING:** Type D-1.5 fits 1.5" standard npt tank flange. Type D-2 fits standard 2" npt tank flange. This is the only part of the gauge that differs between types D-1.5 and D-2. D-0.75" fits standard 0.75" npt tank flange. The float is smaller on this version.

F. **STANDARD ROD:** 0.1875 dia. galvanized steel rod. (**options**-stainless steel)

G. **PUSH ROD:** 0.125 dia. galvanized steel rod activates indicator disc by movement of float arm (I). (**options**-stainless steel)

H. **BRASS RIVETS:** Four brass tubular rivets. (**options**-non-riveted, stainless)

I. **FLOAT ARM ASSEMBLY:** 0.1875 x 0.0625 galvanized steel flat rod, including bracket and rod, attached to standard, push rod, and plastic float. (**options**-stainless steel)

J. **PLASTIC FLOAT:** High density polyethelene float 1.125" dia. x 3.0" long. (**options**-stainless float, nitrophyll float, 3/4" float poly, 3/4" float nitro.)

At-A-GLANCE Gauges are manufactured to fit specific tank depth dimensions, 6 inches to 12 feet. Although we do recommend the L Gauge (page…18) on tanks 10" and under. Standard rod (F), push rod (G), float arm assembly (I) are varied in length to provide correct operation of gauge.

Ordering Instructions—Part numbers are as follows: D-(size opening)-(depth of tank in inches). Example D-2-44. For vaulted tank instructions see page…25.
Other Available Options—Alarm (page…17), Gauge Guard (page…20)

KRUEGER SENTRY GAUGE

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Phone:(920) 434-8860 : Fax (920) 434-8897
Office Hours: 7:00 A.M. to 5:00 P.M. (CST)
http://www.kruegersentrygauge.com

FUELTEC MODEL CF4.0

CRITICAL FUEL FILTRATION SYSTEM

For Fuel Storage Up To 10,000 Gallons (38,000 liters)

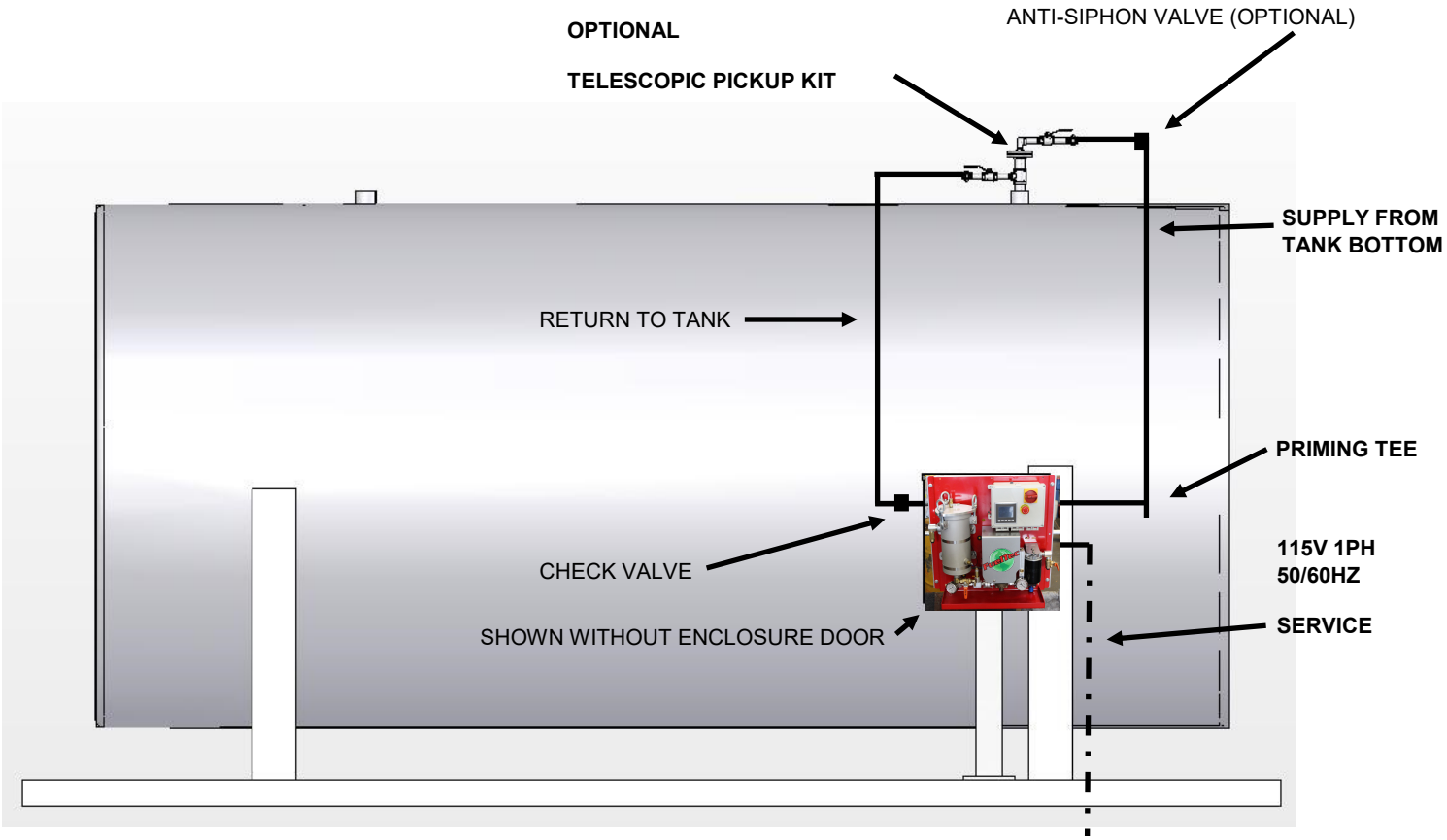
Today's diesel engines require aircraft quality fuel.

- Not to many years ago diesel engines were quite simple, not too efficient, smoked, and burned high sulfur fuel (as much as 5,000 parts per million). The older diesel injection systems only use about 1⁄2 the fuel pressure modern engines do, and older injectors send the fuel through much larger passages. If there was a little moisture in the storage tank, the high sulfur content killed most of the filter clogging bacteria and fungi.
- Today's diesel fuel is ultra-low sulfur (15 parts per million) which allows bacteria and fungi to grow rapidly if any moisture is in the fuel storage tank.
- Today's diesel engines use high pressure, 27,000 to 35,000 psi fuel injectors with tiny fuel passages which are easily clogged with dirty fuel and damaged by water.
- The days of using grandpa's old style boat or tractor filters on your diesel fuel tank are over.
- The old style filters and water separators that remove 75% to 99% of the contamination are not good enough for today's diesel engines.
- Magnets and filter-less devices won't clean fuel to ISO 18/16/13 or remove water to 0.05%
- Both Caterpillar and Cummins call for fuel to meet or exceed ISO cleanliness levels of 18/16/13 with a water content of less than 0.05%
- Fueltec's systems meet or exceed these ISO levels with a one micron primary filter, micro-glass filter/coalescer, and Teflon coated stainless steel hydrophobic water separator. Fueltec uses this type of system on aircraft "Jet-A or JP-8 Jet fuel.

Diesel fuel will meet this ISO level after ***one pass*** through Fueltec's Model CF4.0

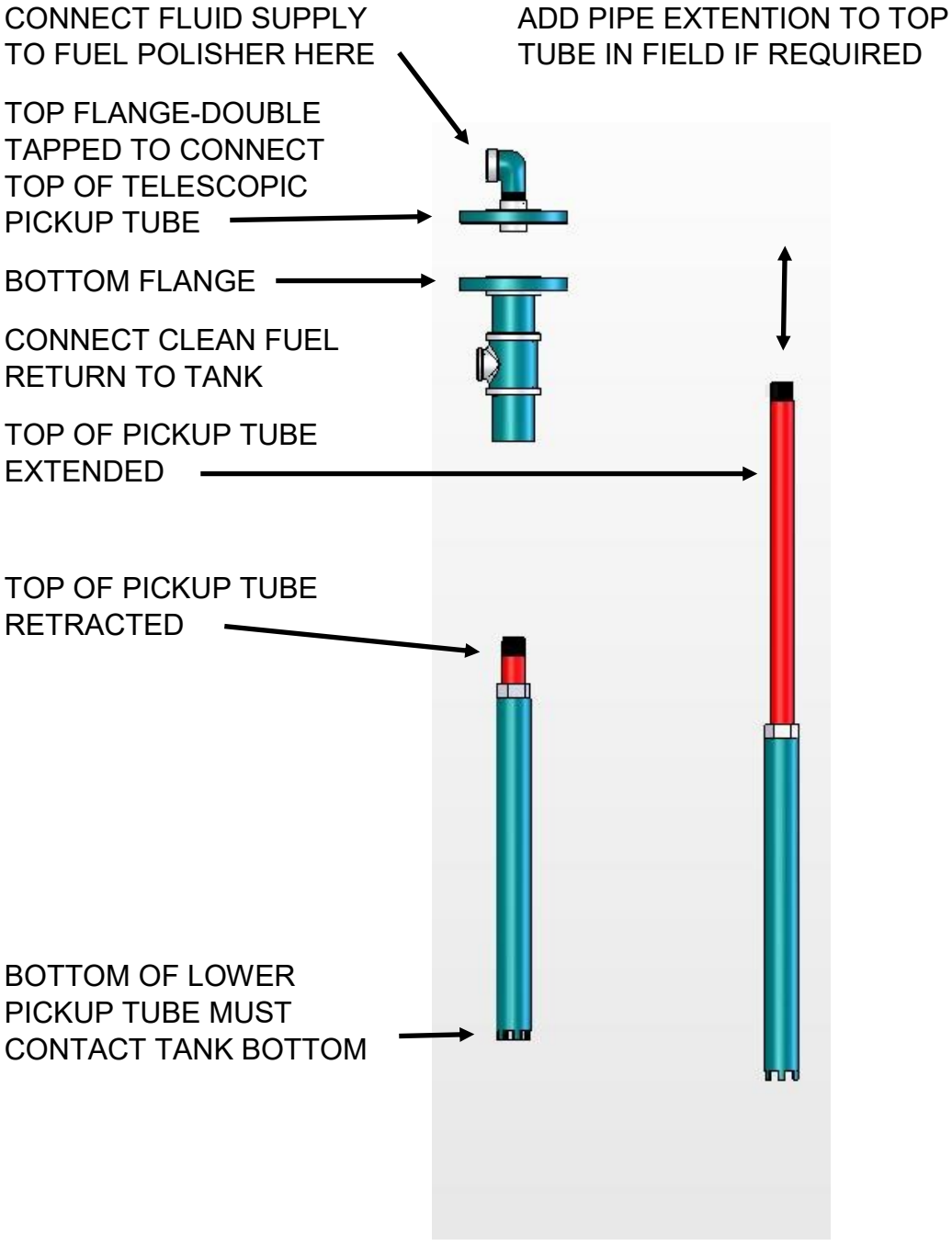
CF4.0 ONE TANK SYSTEM

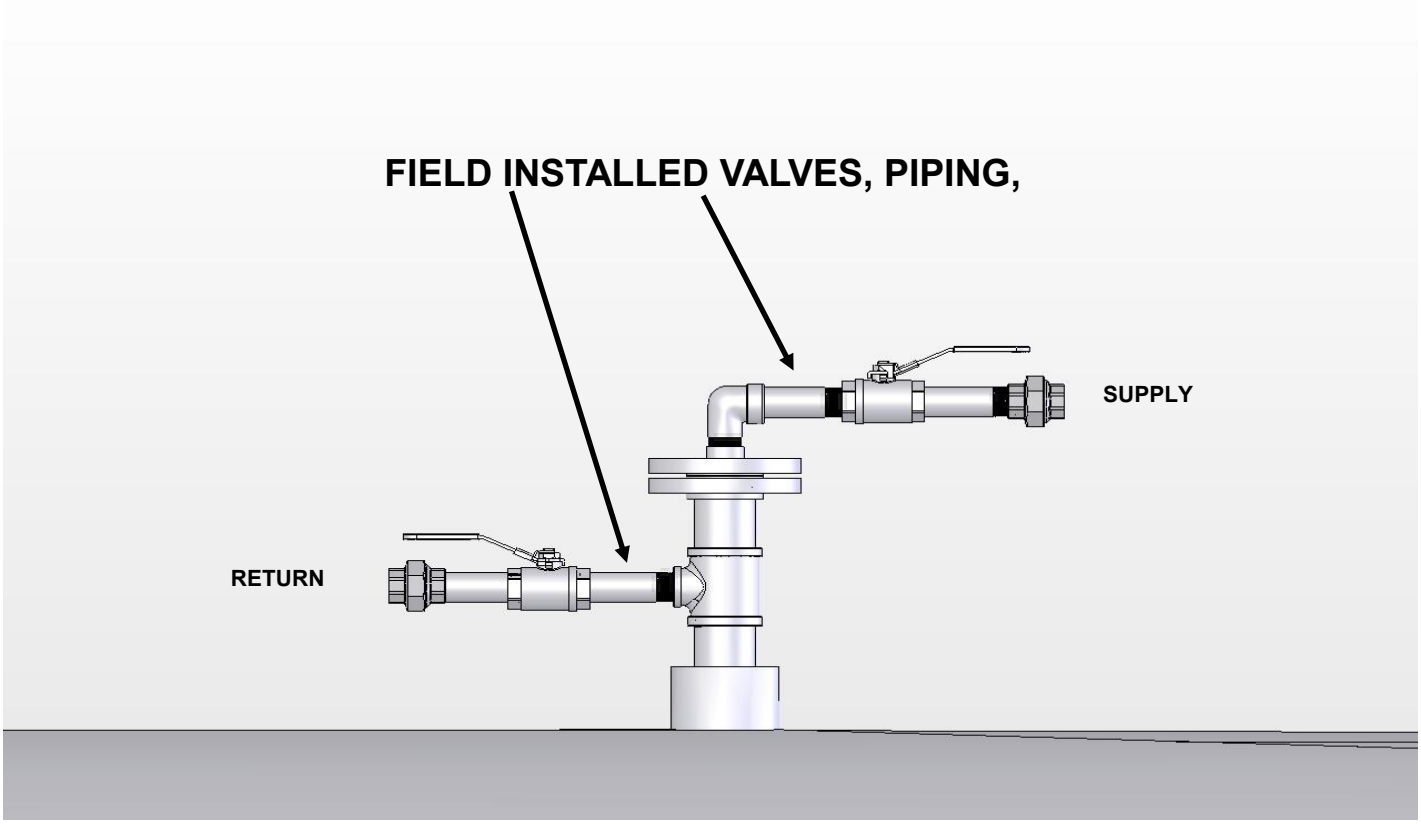
FIELD INSTALLED VALVES, PIPING, & ELECTRIC



OPTIONAL TELESCOPIC PICKUP KIT

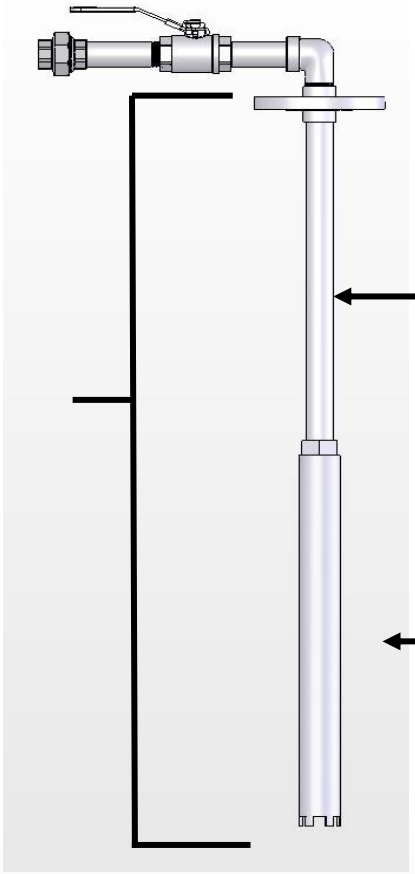
PART NO. 100046




FIELD INSTALLED VALVES, PIPING,
SUPPLY
RETURN

DROP PIPE INSTALLATION

LOWER DROP PIPE ASSEMBLY THROUGH TANK FLANGE ASSEMBLY

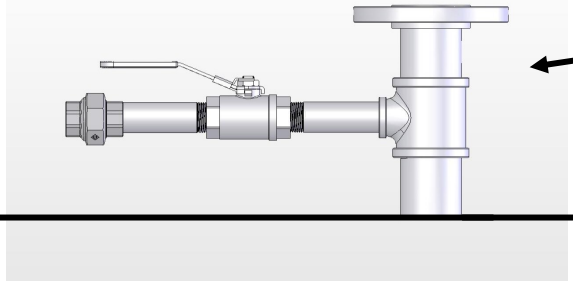


FABRICATE 1” SCH 40 PIPE

NOZZLE TO BE AT TANK BOTTOM
WHEN FLANGES ARE CONNECTED

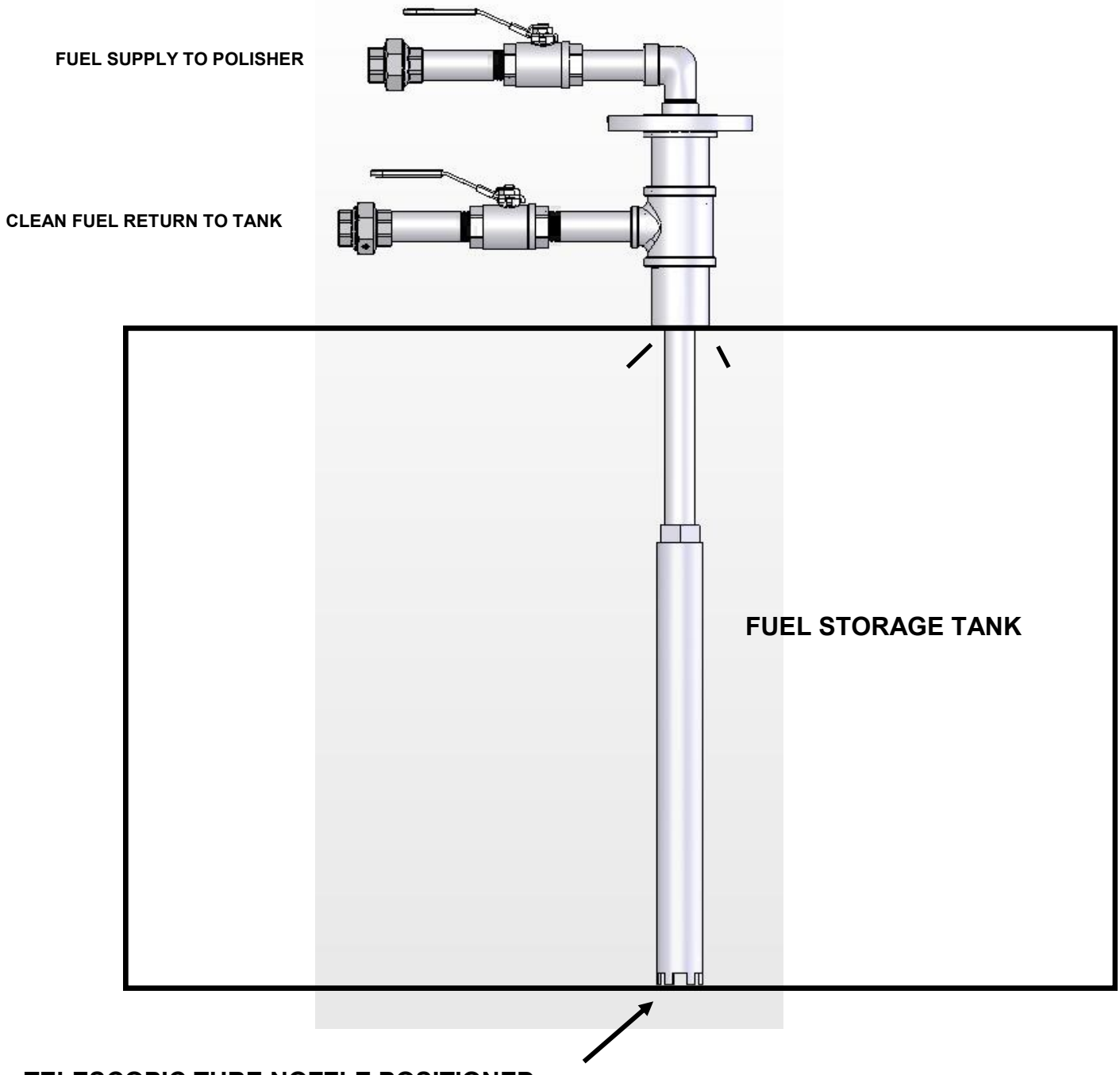
DROP PIPE ASSM.

TELESCOPIC NOZZLE 19”



TANK FLANGE ASSEMBLY

FUEL STORAGE TANK


FUEL SUPPLY TO POLISHER
CLEAN FUEL RETURN TO TANK
FUEL STORAGE TANK
TELESCOPIC TUBE NOZZLE POSITIONED
ON TANK BOTTOM

FUELTEC CF4.0 PCB & PLC TANK MOUNTED

Quality First
100% Made in U.S.A.

For Fuel Storage Up To 10,000 Gallons (38,000 liters)

Overview

- The Model 4.0-PLC is a fuel polishing system that automatically removes water and debris to prevent bacterial growth and unexpected engine shut down.
- A stand alone system that can be used on diesel fuel storage tanks with capacities to 10,000 gallons.
- In operation the system vacuums fluid from the storage tank bottom, removes water and contaminates then returns the clean dry fuel back to the tank.
- This system maintains a condition exceeding the engine manufacturer's recommended cleanliness levels of ISO particle code 18/16/13.

PLC/HMI

Touch Screen Controller:

- Controller will set filtration cycle time
- High separator water alarm
- Change primary filter alarm
- Change secondary filter alarm
- Fluid leak alarm
- System operating
- Underwriters Laboratory 508A Listed
- Modbus ready

Fuel Pump:

Industrial bronze positive displacement gear pump rated at four gallons per minute, 100% duty cycle.

Self priming pump lifts 16 feet and features a 115/230 Volt 60Hz 1PH 4.7A Motor

Stainless Fuel/Water Separator:

First phase 3 micron spin-on filter

Second phase Micro-Glass (jet fuel type) Coalescer removes tiny water droplets of free and emulsified water from fuels by causing the droplets to grow larger until contained in a water trap.

The third phase utilizes a water repellant Teflon screen to keep the water from flowing with the fuel.

The water is removed to less than 50 parts per million as recommended by engine manufacturers.

Powder coated aluminum enclosure

W31" x D13" x H35" Wt. 145 LBS

SKU 100022

TANK MOUNTING allows you to mount the system directly on your sub-base or round tank.

A telescopic fuel pickup will vacuum even tiny droplets of water and debris from your tank bottom.

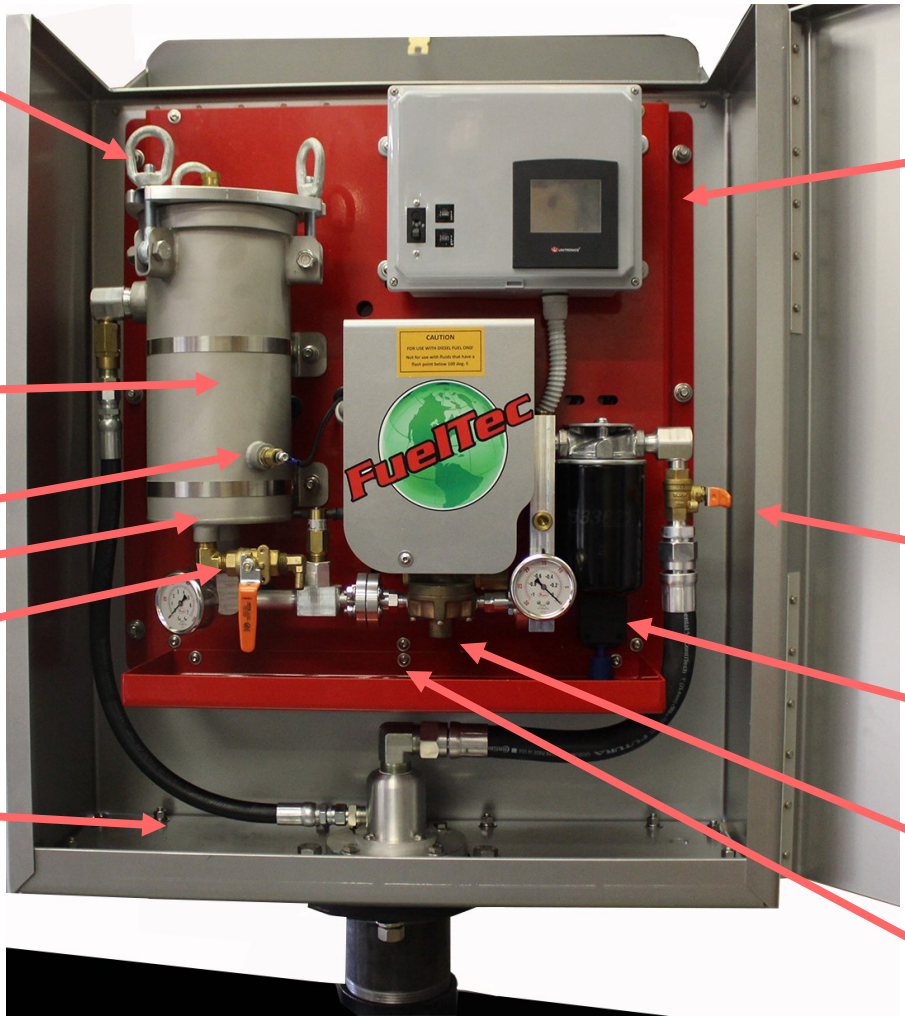
System Options:

- Heated filter housings

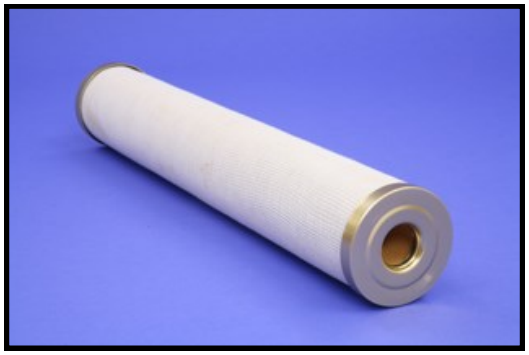
UL LISTED

PEI MEMBER

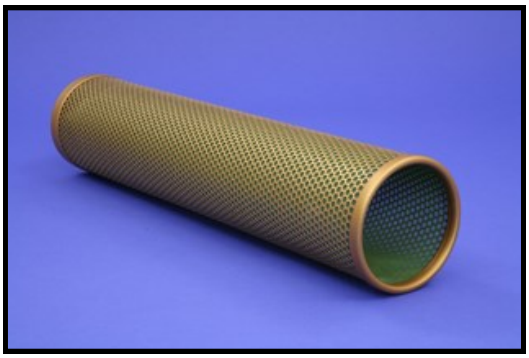
FUELTEC CF4.0-PCB TANK MOUNT



TANK MOUNT



Micro-glass coalescer causes tiny water droplets to increase in size so they will not pass through the water separator



Teflon coated hydrophobic water separator prevents water from traveling with the fuel

UL LISTED

PEI MEMBER

DIESEL FUEL IN STORAGE

WATER is diesel fuel's worst enemy:

A critical power systems reliability is only as good as the condition of its fuel.

Virtually all diesel fuel contains some moisture. Additional water builds in tanks as atmospheric moisture condenses. Moisture can accumulate in diesel tanks as condensate droplets on exposed tank surfaces, as dissolved water in the fuel, and as water bottoms beneath the fuel. Microbes depend on this water for growth.

Water in diesel fuel becomes a breeding ground for filter clogging bacteria and fungus.

Without proper removal, sitting water can become a veritable Petri dish in your fuel storage tank.

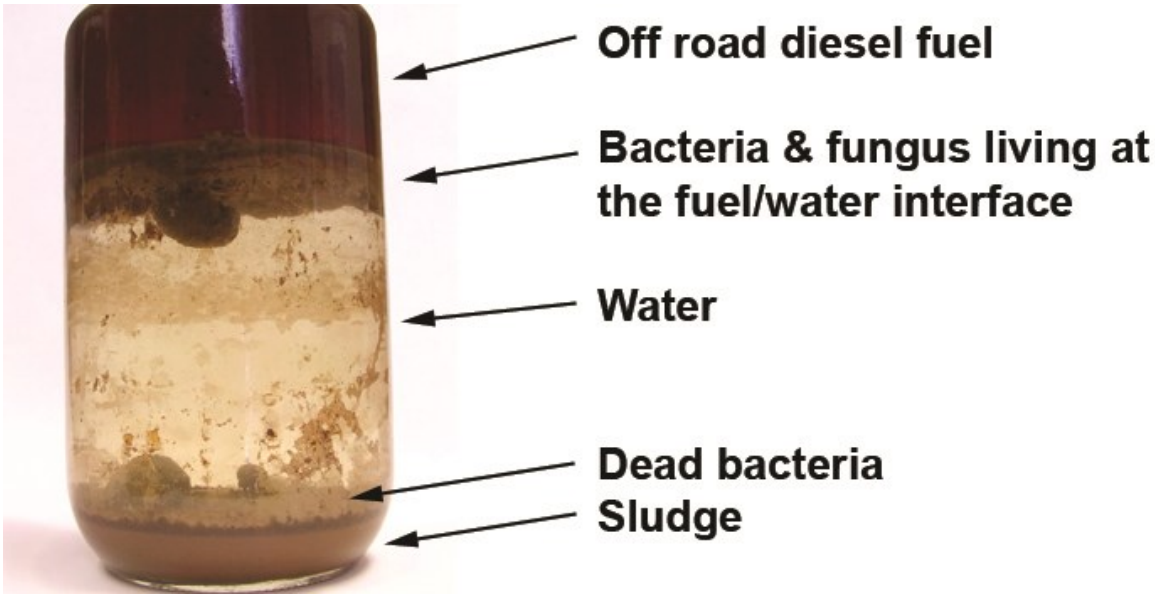
ANNUAL TANK CLEANING MAY NOT BE THE ANSWER TO SAFE FUEL:

Under ideal conditions, with water present, bacteria can double in size & divide in "two" every 20 minutes, onset of a serious infestation can be a matter of just weeks.

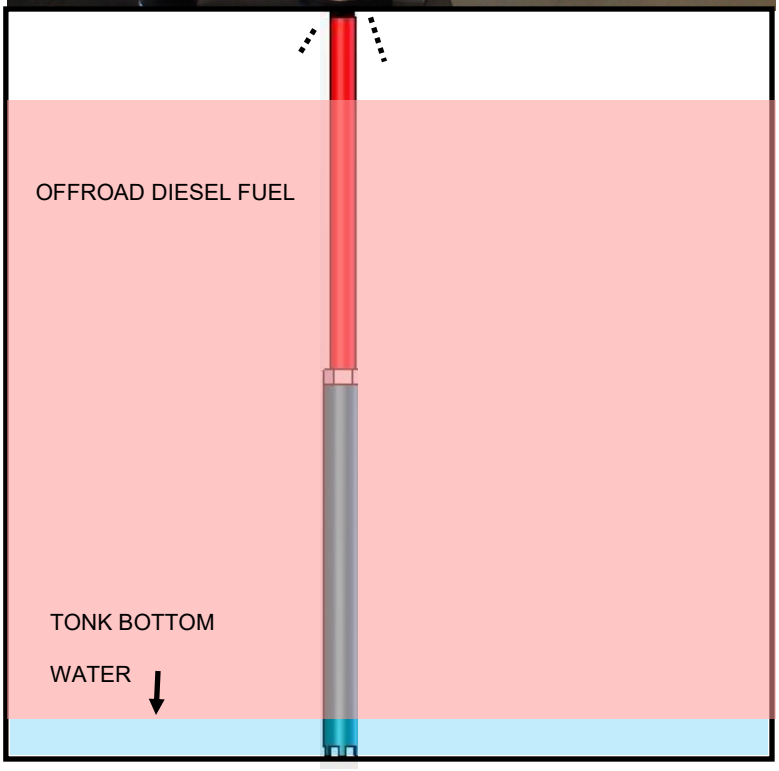
A SIMPLE SOLUTION:

Remove fuel tank water…..Bacteria can not live without water.

The Fueltec Model CF4.0 operating just 6 hours per day will keep up to 10,000 gallons of #2 diesel clean and dry.



FUELTEC MODEL CF4.0-PCB TANK



TELESCOPIC FLUID SUCTION TUBE

LOCATED ON TANK BOTTOM TO REMOVE

WATER & DEBRIS

TANK MOUNT SYSTEM

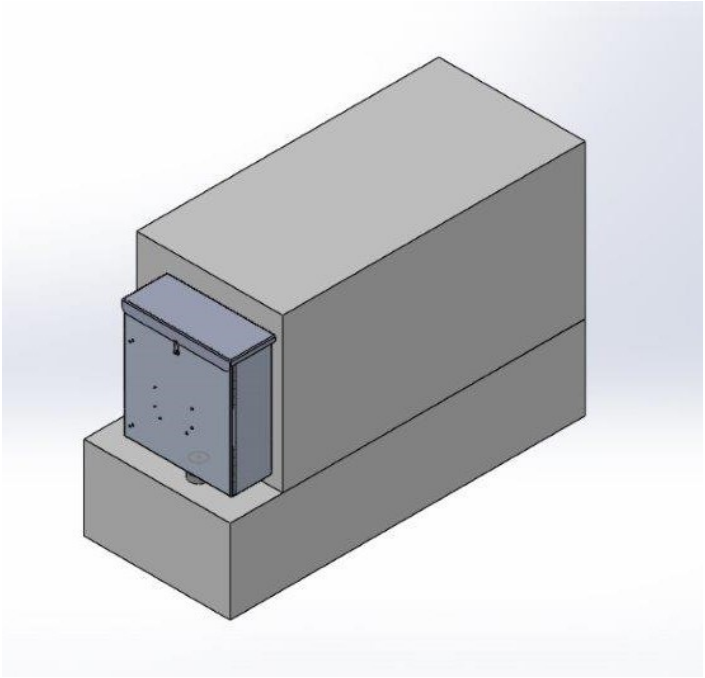
FOR ROUND OR SUB-BASE TANKS

SKU 100033

Fueltec's Proprietary tank mount systems can be installed in less than one hours time eliminating costly installation and piping.

After installing the telescopic fuel pickup tube to the tank, connect the system's sealed flanges and you are done.

Make a simple electric service connection and you are ready to polish fuel.

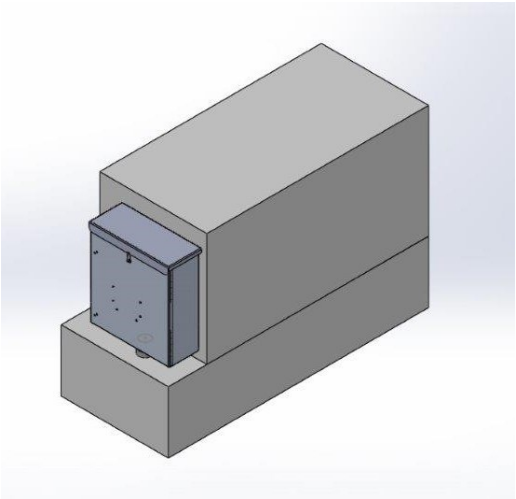


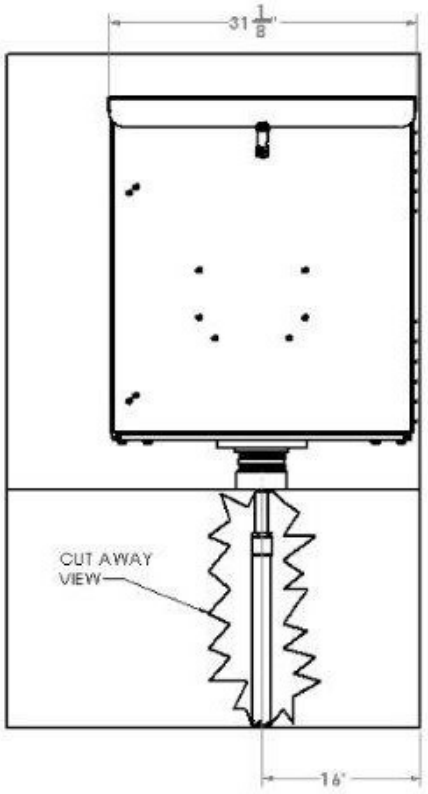
Powder coated aluminum enclosure

W31" x D13" x H35" Wt. 145 LBS

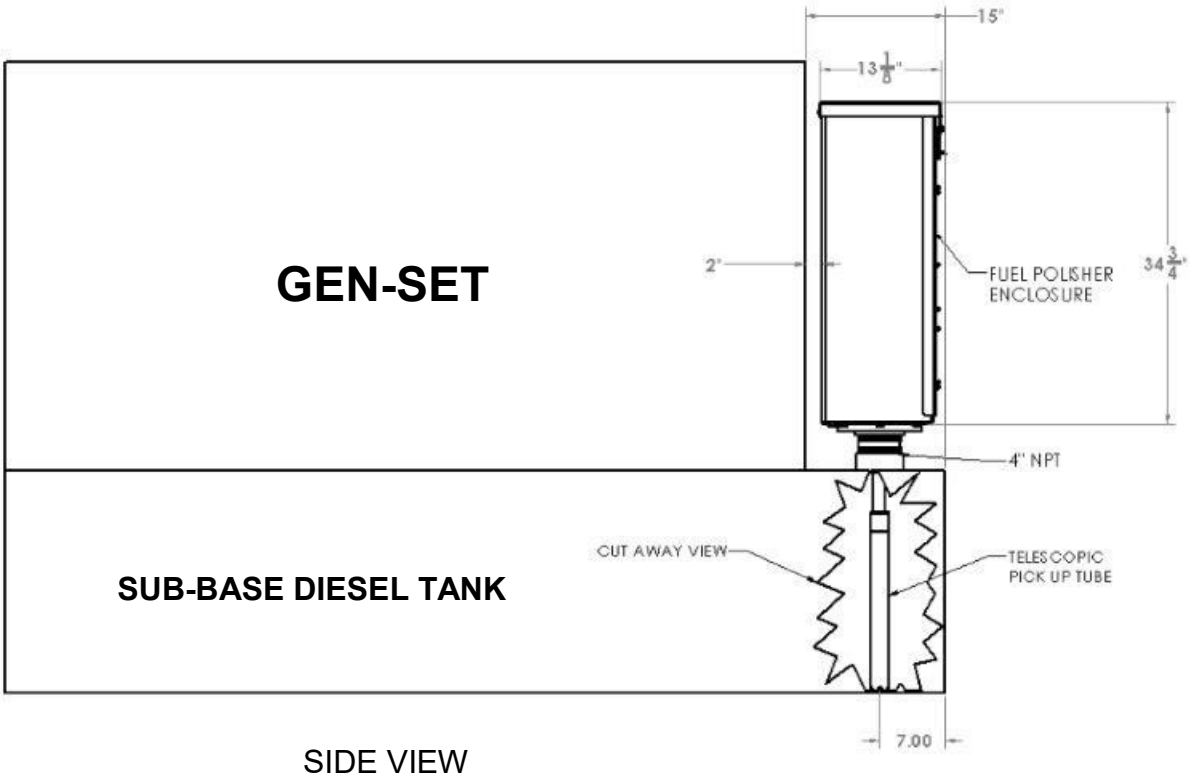
FUELTEC MODEL CF4.0-PCB

SUB-BASE MOUNTED
FUEL POLISHER





END VIEW



SIDE VIEW

Sizing Your Fuel Filtration System

A 200 KV Standby Generator's sub-base fuel tank may be 1,385 gal. 163.4"L X 65.5"W X 49.7"H with useable fuel of 1,296 gal.

- 1/2" of water in the tank= 23.2 gallons
- Fueltec's Model CF4.0 can separate and remove 23.2 gallons from the fuel tank in 5.8 minutes.
- The CF4.0's daily cycle time is 360 minutes.
- Water can be drained from the system under pressure without stopping the fuel pump.

Remove the water from your tank and the microbes (algae) can not live to clog your engine filters.

4.0-PLC TECHNICAL SPECIFICATIONS:

- **Telescopic Fluid Pickup Tube**
- **Working pressure fuel: max. 40 PSI**
- **Maximum Flow rate: 240 Gallons per hour ***
- **Water Trap: standard**
- **Width: 30" Depth: 12" Overall Height 30"**
- **Pump: Cast bronze, Gear, 4GPM, 115/230V 4.7A 50/60Hz**
- **Inlets/Outlets: 1"**
- **Primary Filter: 3 micron**
- **Water Coalescer: Micro-glass (Mil-type)**
- **Water Separator: HydrophobicTeflon**
- **Pressure Gauges:**
- **WEIGHT 145 LBS.**
- **W31" X D13" X H35"**

Alarms:

- **High water in separator**
- **Primary filter change required**
- **Fluid in sump**
- **System off**

Option:

- **Heated Housing**

Fueltec Systems, LLC
PO BOX 14889 FORT PIERCE, FL 34979
www.fueltecsystems.com

FuelTec *Quality First* *100% Made in U.S.A.*

Fueltec's Mobile and Stationary Fuel Polishing Systems are in use Worldwide:

- **South Florida Water Management District**
- **US Navy Special Operations Norfolk, VA**
- **US Navy Port Operations San Diego, CA**
- **Homestead AFB FL**
- **Federal Aviation Administration DFW Airport**
- **Federal Aviation Administration HI. Airport**
- **Big "G" Data Center, Taiwan**
- **Palm Beach County, FL correctional facilities**
- **City of Seattle, WA**
- **MTN Group, Nigeria, Africa telecommunications**
- **Morgan-Stanley Data Center, NJ**
- **VA Hospital Temple, TX**
- **Mayo Clinic, Jacksonville, FL**
- **Emerald Coast Utilities Authority, Pensacola, FL**
- **Allen Memorial Hospital, Waterloo, Iowa**
- **And hundreds of Petroleum Contractors, Mechanical Contractors, Boat Yards, and Environmental Service Companies.** ***Just to name a few.***

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PO Box 487
3821 N Main Street Granite Falls, NC 28630
www.fueltecsystems.com

Sizing Your Fuel Filtration System

Water and most fuel contaminants are heavier than fuel and will settle in a lower phase on the tank bottom.

Contrary to some beliefs; Testing has proven that this lower phase may only be 5-10% of the tanks content.

The upper phase of 90-95%; if left un-disturbed will remain clean and relatively dry.

Therefore a properly designed system will remove this bottom phase of water and contaminates without mixing with the clean upper phase fuel.

The 4.0-PLC is a 240 GPH system.

Example "A": One (1) 10,000 gal. tank containing a total of 7,200 gal. of product.

To filter and remove water from 25% of 7,200 gal. = 1,800 gal.

Operating 7.5 hours per day will circulate and remove contaminates from 1,800 gal. in one day.

Example "B": One (1) 5,000 gal. tanks containing a total of 4,000 gal. of product.

To filter and remove water from 25% of 4,000 gal. = 1,000 gal.

Operating 4.2 hours per day will circulate and remove contaminates in 1,000 gal. in one day.

Example "C": One (1) 1,000 gal. tank containing a total of 900 gal. of product.

To filter and remove water from 25% of 900 gal. = 225 gal.

Operating less than one hour per day will circulate and remove contaminates in 225 gal.

4.0-PLC TECHNICAL SPECIFICATIONS:

- **Maximum Fuel Tanks Served: four AST**
- **Maximum lift: 16 feet**
- **Working pressure fuel: max. 40 PSI**
- **Maximum Flow rate: 240 Gallons per hour ***
- **Water Trap: standard**
- **Width: 30" Depth: 12" Overall Height 30"**
- **Pump: Cast bronze, Gear, 4GPM, 115/230V 50/60Hz**
- **Inlets/Outlets: 1"**
- **Vacuum Gauge:**
- **Primary Filter: 10 micron**
- **Water Coalescer: Micro-glass (Mil-type)**
- **Water Separator: Perforated metal/Teflon**
- **Pressure Gauges:**

Alarms:

- **High water in separator**
- **Primary filter change required**
- **Fluid in sump**
- **System off**

Options:

- **Heated Housings**
- **Installation Kits with drop pipe, tank flanges, flexible or telescopic pickup tubes.**
- **GSM Modems for fuel condition reporting**

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3821 N Main Street Granite Falls, NC 28630
www.fueltecsystems.com

ATTACHMENT A - SUBMITTAL DATA SHEET FOR
26 32 13, ENGINE GENERATORS

Submit the following data with Bid Proposal and with Shop Drawing:

Item No.	Description	480V Generator For Spillway
1	Manufacturer of Generator:	Kohler Power Systems
2	Total Equipment Dimensions for Generator(inches): Length x Width x Height	90.6"L x 40.9"W x 44.5"H
3	Total (weight) Weight (lbs.):	1855
4	Fuel Consumption (gallons/hour)	1.6 _____at 25% generator KW rating 2.8 _____at 50% generator KW rating 4.3 _____at 75% generator KW rating 5.4 _____at 100% generator KW rating
5	Capacity of External Fuel Tank (gallons)	500 gallon
6	External Fuel Tank Dimensions (inches) & Weight: Length x Width x Height Weight (lbs) – Dry Weight (lbs) – Wet	40”H x 48”W x 96”L 2000 lbs dry 4,000 lbs wet

END OF ATTACHMENT

Equipment Submittal

Sabine River Authority

KSS-AMVB-0230S - 230 AMP Automatic Transfer Switch

Account Manager: Jonathan Proctor
(936)577-4535
jproctor@loftinequip.com

Loftin Equipment Company
1241 Universal City Blvd.
Universal City, TX
85008
(210) 881-1623
www.loftinequip.com

KOHLER POWER SYSTEMS

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

KOHLER Power Systems
444 Highland Drive, MS 072, Kohler, WI 53044
Phone: 920-457-4441
Visit us at KohlerPower.com
www.kohlerpower.com

Automatic Transfer Switch

Kohler Model: KSS-AMVB-0230S

4 Pole, 4 Wire, Switched Neutral, 230 amp, Kohler Specific Breaker rated Standard automatic transfer switch, Model KSS-AMVB-0230S, rated 480V, 60 Hz complete with all standard equipment and housed in a NEMA Type 12 enclosure.

Qty	Description
	ATS KSSB Transfer Switch System
1	KSS-AMVB-0230S

Includes the following:

Literature Languages	English
Mechanism	Specific Breaker
Transition	Standard
Logic	1200
Voltage	480V / 60 Hz
Poles & Wires	4 Pole/4 Wire, Switched Neutra
Enclosure	Nema 12
Amps	230 Amps
Connection	Standard
IBC Seismic Certification	None
CSA Certification	None
Miscellaneous Acc.,Installed	Ethernet Accessory, MPAC
Miscellaneous Acc.,Installed	High V/I In/Out Module, Qty 2
Miscellaneous Acc.,Installed	Logic Disconnect Switch
Miscellaneous Acc.,Installed	Heater, MPAC
Warranty	2-YR BASIC

1	Converter, Modbus to Ethernet
1	Lit Kit, ATS Production, KSS

Transfer Switch Extended Two-Year Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product	**Warranty Coverage**
Transfer switch and factory-supplied transfer switch accessories	Two (2) years from the registered startup date.
Transfer switch main contacts	Ten (10) years from the registered startup date.

This warranty is not effective unless a proper extended warranty registration form and warranty fee have been sent to Kohler Co. within one year of registered startup. The extended warranty start date is determined by the standard warranty requirements and runs concurrent with the standard warranty during the first year. To receive extended warranty coverage, the provisions of the standard warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal wear, periodic service, and routine adjustments.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by:
   a. Operation above or below rated capacity, voltage, or frequency.
   b. Modifications.
   c. Installation contrary to published specifications and codes.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide a clean, dry environment.
   b. Failure to perform recommended exercising.
   c. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   d. Use of parts and/or procedures other than factory-supplied or -approved replacement parts and/or procedures.
5. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
6. Original installation charges and startup costs.
7. Additional expenses for repair after normal business hours, i.e. overtime or holiday labor rates.
8. Rental of equipment during performance of warranty repairs.
9. Removal and replacement of non-Kohler-supplied options and equipment.
10. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
11. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
12. Maintenance items such as fuses, lamps, and adjustments.
13. Labor and travel charges after the second year of the transfer switch main contacts warranty period.
14. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Kohler Power Systems Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER®

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Transfer Switch Standard Features

- UL 1008 listed file #E58962 (automatic), #E86894 (non automatic)
- CSA certification available
- IBC seismic cerfiticaion available
- Available in 2, 3, or 4 pole configurations
- Electrically operated, mechanically held mechanism
- High withstand amd close-on ratings
- Design suitable for emergency and standby applications on all classes of load, 100% tungsten rated through 400 amps
- Silver alloy main contacts
- Gold-flashed engine start contacts rated 2 amps @ 30 VDC/250 VAC
- Front-accessible contacts for easy inspection
- Front-replaceable main and arcing contacts (800-1200 amps)
- Reliable, field-proven solenoid mechanism
- Switching mechanisms lubricated for the expected life of the transfer switch
- Internal manual operating handle
- Main shaft auxiliary position-indicating contacts rated 10 amps @ 32 VDC/250 VAC
- NEMA type 1, 12, 3R, 4 and 4X enclosures available
- Standard one-year limited warranty. Extended limited warranties are available.
- Standard-transition operation with either automatic or non-automatic control
- Standard-transition transfer time less than 100 milliseconds (6 cycles @ 60 Hz)
- Double-throw, mechanically interlocked design (break-before-make power contacts)
- Solid, switched, or overlapping (make-before-break) neutral

Decision-Maker® MPAC 1200 Controller

- LCD display, 4 lines x 20 characters, backlit
- Complete programming and viewing capability at the door using the keypad and LCD display
- LED indicators: Source available, transfer switch position, service required (fault), and "not in auto"
- Programmable voltage and frequency pickup and dropout settings
- Programmable time delays
- Programmable generator exerciser
- Time-based load control
- Two programmable inputs and two programmable outputs
- Up to four I/O extension modules available
- Modbus communication standard
- RS-485 communication standard
- Ethernet communication optional: For more information about Decision-Maker® MPAC 1200 features and functions, see specification sheet G11-127.

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

Input and Output Connection Specifications	
Component	Wire Size Range
Main board I/O terminals	#12-24 AWG
I/O module terminals	#14-24 AWG

Auxiliary Position Indication Contacts (rated 10 Amps @ 32 VDC/250 VAC)	
Switch Rating, amps	Number of Contacts Indicating Normal, Emergency
230	2, 2

Weights and Dimensions

See ADV drawings for weights and dimensions. Allow 15% additional weight for packing materials.

UL-Listed Solderless Screw-Type Terminals for External Power Connections			
Range of Wire Sizes, Copper or Aluminum*			
Switch Rating, Amps	Normal, Emergency, and Load	Neutral	Ground
230 (204-480 V)	(1) #14 AWG to 4/0 AWG Cu only	(3) #14 to 4/0 AWG Cu only	(3) #6 to 3/0AWG
230 (260 V)	(1) #4 AWG to 600 KCMIL or (2) 1/0 AWG to 250 KCMIL	(3) #4 AWG to 600 KCMIL or (6) 1/0 AWG to 250 KCMIL	(3) #4 AWG to 600 KCMIL or (6) 1/0 AWG to 250 KCMIL
* Use 75 degrees C minimum Cu/Al wire for power connections * Use 75 degrees C minimum Cu/Al wire for power connections			

Withstand and Close-On Ratings (WCR) Ratings Summary

The transfer switch is rated for use on a circuit capable of delivering not more than the RMS symmetrical amperes listed at the specified maximum voltage below, but no greater than the interrupt capacity of the selected circuit breaker or fuse. Circuit breakers and fuses are supplied by the customer.

	Withstand and Close-On Ratings (WCR) Standard, Programmed, and Closed-Transition Models									
	Current Limiting Fuses				Specific Coordinated Breaker			Time-Based Rating		
Switch Rating, Amps	Fuse Class	Max Amps	480 VAC	600 VAC	240 VAC	480 VAC	600 VAC	Time sec.	480 V Max.	600 V. Max

Ratings with Specific Manufacturer's Circuit Breaker

Withstand and close-on ratings (WCR) in RMS symmetrical amperes for specific manufacturers' circuit breakers.

Molded-Case Circuit Breakers					
Switch Rating, Amps	WCR, Amps, RMS	Voltage, Max.	Manufacturer	Type	Max. Size, Amps
230	200000	240	Square D	JR	250
230	125000	240	Square D	JL	250
230	100000	240	Square D	JJ	250
230	65000	240	Square D	JG	250
230	42000	240	Square D	QR, QJ	225
230	25000	240	Square D	JD	250
230	85000	480	Square D	JL, JR	250
230	30000	480	Square D	JG, JJ	250
230	18000	480	Square D	JD	250
600	42000	600	Eaton/Cutler Hammer	JGU, JGX, JGH	250
600	42000	600	Eaton/Cutler Hammer	KDC	400
600	42000	600	Eaton/Cutler Hammer	LDC, CLDC	600
600	42000	600	General Electric	TBC4	400
600	42000	600	General Electric	SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP	600
600	42000	600	Square D	HJ, HL, HG	150
600	42000	600	Square D	KI, JJ, JL, JR, CF250L	250
600	42000	600	Square D	CK400H, CK400HH, CJ400L	400
600	42000	600	Square D	LI, MasterPact STR 28D, PK	600
600	42000	600	Siemens/ITE	HJD, CFD6	250
600	42000	600	Siemens/ITE	HHJD6, HHJXD6, CJD6, SCJD6	400
600	42000	600	Siemens/ITE	HHLD6, HHLXD6, CLD6, SCLD6, LNG, LPG, LGC*, LGU*, LGX*	600

Codes and Standards

The ATS meets or exceeds the requirements of the following specifications:

- Underwriters Laboratories UL 1008, Standard for Automatic Transfer Switches for Use in Emergency Standby Systems file #E58962 (automatic), #E86894 (nonautomatic)
- CSA C22.2 No. 178 certification 208-600 VAC available, file #LR58301
- NFPA 70, National Electrical Code
- NFPA 99, Essential Electrical Systems for Health Care Facilities
- NFPA 110, Emergency and Standby Power Systems
- IEEE Standard 446, IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- NEMA Standards ICS 10-2005, Electromechanical AC Transfer Switch Equipment
- EN61000-4-4 Fast Transient Immunity Severity Level 4
- IEC 609047-6-1, Low Voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment
- EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- IEC Spedifications for EMI/EMC Immunity:
  - CISPR 11, Radiated Emissions
  - IEC 1000–4–2, Electrostatic Discharge
  - IEC 1000–4–3, Radiated Electromagnetic Fields
  - IEC 1000–4–4, Electrical Fast Transients (Bursts)
  - IEC 1000–4–5, Surge Voltage
  - IEC 1000–4–6, Conducted RF Disturbances
  - IEC 1000–4–8, Magnetic Fields
  - IEC 1000–4–11, Voltage Dips and Interruptions
- IEEE 472 (ANSI C37.90A) Ring Wave Test
- Seismic certification in accordance with the International Building Code is available. (Accessory kit is required for seismic certification)
  - IBC 2000, referencing ASCE 7-98 and ICC AC-156
  - IBC 2003, referencing ASCE 7-02 and ICC AC-156
  - IBC 2006, referencing ASCE 7-05 and ICC AC-156
  - IBC 2009, referencing ASCE 7-05 and ICC AC-156
  - IBC 2012, referencing ASCE 7-10 and ICC AC-156

Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

Heater, Anti-Condensation

- Hygrostat-controlled 120 VAC strip heater (customersupplied voltage source required)
- 100 or 250 watts (sized for enclosure)
- Protective 15 Amp circuit breaker

Controller Disconnect Switch

- Disconnects power to controller without disconnecting load
- Mounts inside the enclosure

High Power Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs	
OutputsAvailable	3
Contact Type	Form C (SPDT)
Contact VoltageRating	12 A @ 24 VDC 12A @ 250 VAC 10 A @ 277 VAC 2 A @ 480 VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Environmental Specification	
Temperature	'-40 deg C to 85 deg C (-40 deg F to 185 deg F)
Humidity	35% to 85% noncondensing

Warranty

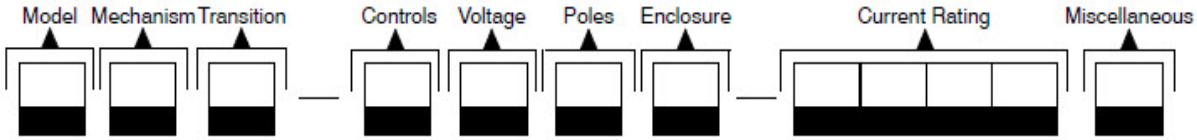
Accessory Modules

The mounting kit holds up to five optional modules. The maximumtotal current draw is 300 mA. If an External Battery Module isinstalled, there is no current restriction.

- Alarm Module
- External Battery Supply Module
- Standard I/O Module
- High Power I/O Module

Ethernet Communications

Model Designation



Record the transfer switch model designation in the boxes. The transfer switch model designation defines characteristics and ratings as explained below.

Sample Model Designation: KSS-AMTA-0400S

Model

K: Kohler

Mechanism

S: Standard (Specific Breaker)

Transition

S: Standard

Controller

A: Decision-Maker® MPAC 1200, Automatic

B: Decision-Maker® MPAC 1200, Non-Automatic

Voltage/Frequency

C:	208 Volts/60 Hz	K:	440 Volts/60 Hz
D:	220 Volts/50 Hz	M:	480 Volts/60 Hz
F:	240 Volts/60 Hz	N:	600 Volts/60 Hz
G:	380 Volts/50 Hz	P:	380 Volts/60 Hz
H:	400 Volts/50 Hz	R:	220 Volts/60 Hz
J:	416 Volts/50 Hz	S:	400 Volts/60 Hz

Number of Poles/Wires

N: 2 Poles/3 Wires, Solid Neutral

T: 3 Poles/4 Wires, Solid Neutral

V: 4 Poles/4 Wires, Switched Neutral

W: 4 Poles/4 Wires, Overlapping Neutral

Enclosure

A:	NEMA 1	D:	NEMA 4
B:	NEMA 12	F:	NEMA 4X
C:	NEMA 3R	G:	Open Unit

Current, Amps

0030	0200	0600
0070	0230	0800
0104	0260	1000
0150	0400	1200

Connections

S: Standard

Note: Some selections are not available for every model. Contact your Kohler distributor for availability.

KOHLER®

Automatic Transfer Switch Controller

Decision-Maker® MPAC 1200

Model KCS with Decision-Maker® MPAC 1200 Controller

Applicable Models

Model	Description
KCS	Standard-Transition Any Breaker ATS ‡
KCP	Programmed-Transition Any Breaker ATS ‡
KCC	Closed-Transition Any Breaker ATS §
KSS	Standard-Transition Specific Breaker ATS ‡

‡ Available with automatic or non-automatic controller
§ Available with automatic controller only

Decision-Maker® MPAC 1200 Controller Standard Features

- Microprocessor-based controller
- Environmentally sealed user interface
- LCD display, 4 lines x 20 characters, backlit
- Dynamic function keypad with tactile feedback pushbuttons allows complete programming and viewing capability at the door
- LED indicators: Source available, transfer switch position, service required (fault), and not in auto
- Broadrange voltage sensing (208- 600 VAC) on all phases
- Phase-to-phase sensing and monitoring with 0.5% accuracy on both sources
- Line-to-neutral monitoring
- Frequency sensing with 0.5% accuracy on both sources
- Anti-single phasing protection
- Phase rotation sensing for three-phase systems
- Real-time clock with automatic adjust for daylight saving time and leap year
- Run time clock and operation counter
- Time-stamped event log
- Fail-safe transfer for loaded test and exercise functions
- DIP switches: password disable and maintenance
- Isolated RS-485 ports for Modbus connections (9.6, 19.2, and 57.6 kbps)
- Modbus® RTU protocol (Modbus register map available)
- USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
- Available in automatic and non-automatic versions; see supervised transfer control switch on page 5

Programmable Features

- Programming and monitoring methods:
  - Monitoring and password-protected programming at the door using the keypad and display
  - Program using a PC with Kohler® SiteTech™ software (available to Kohler-authorized distributors and dealers)
- Over/undervoltage for all phases of the normal and emergency sources
- Over/underfrequency for the emergency source
- Adjustable time delays
- Load/no load/auto-load test and load/no-load exercise functions
- Programmable inputs and outputs
- Load bank control for exercise or test
- Time-based load control, nine individual time delays for selected loads
- In-phase monitor (3-phase only)
- Password protection, three security levels
- See pages 2 and 3 for additional programmable features

* SiteTech software is available to Kohler-authorized distributors and dealers.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1200 Controller Features

User Interface LED Indicators

- Contactor position: source N and source E
- Source available: source N and source E
- Service required (fault indication)
- Not in automatic mode

LCD Display

- System status
- Line-to-line voltage
- Line-to-neutral voltage
- Active time delays
- Source frequency
- Preferred source selection
- System settings
- Common alarms
- Load current, each phase (current sensing kit required)
- Inputs and outputs
- Faults
- Time/date
- Address
- Event history
- Maintenance records
- Exerciser schedule
- Exerciser mode
- Time remaining on active exercise

Dynamic Function Tactile Keypad Operations

- Scroll up/down/forward/back
- Increase/decrease/save settings
- End time delay
- Start/end test or exercise
- Reset fault
- Lamp test

DIP Switches

- Maintenance mode
- Password disable

Event History

- View time and date-stamped events on the display or on a personal computer equipped with Kohler® SiteTech™ software. *****
- Download complete event history files using Kohler SiteTech software and a PC connected to the USB port. *****

Main Logic Board Inputs and Outputs

- Two (2) programmable inputs
- Two (2) programmable outputs

Communications

- Optional Ethernet communications with RJ45 connector for 10/100 Ethernet connection
- Isolated RS-485 ports for Modbus communications
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB Port. Use SiteTech software to upload or download files and adjust transfer switch settings *****
  - Application software
  - Event history files
  - Language files
  - Parameter settings
  - Usage reports
  - Feature configuration

Programmable Features

- System voltage, 208- 600 VAC †
- System frequency, 50/60 Hz †
- Single/three-phase operation †
- Standard/programmed/closed-transition operation †
- Preferred source selection allows the normal or emergency source to be used when both sources are available (alarm module required)
- Phase rotation: ABC/BAC/none selection with error detection
- Overvoltage and undervoltage pickup and dropout settings, both sources
- Overfrequency and underfrequency pickup and dropout settings, Emergency source
- Voltage unbalance, enable/disable
- In-phase monitor: enable/disable and phase angle
- Transfer commit/no commit
- Passwords, system and test
- Time, date, automatic daylight saving time enable/disable
- Time delays (see table)
- Exerciser: calendar mode, loaded/unloaded up to 21 events
- Test: loaded/unloaded/auto load (1- 60 minutes)
- Remote test: loaded/unloaded
- Automatic override on generator failure (loaded test and exercise)
- Peak shave delay enable/disable
- Current monitoring (current sensing kit required)
- Load control pre/post-transfer delays, 9 individual time delays for selected loads
- Resettable historical data

***** SiteTech software is available to Kohler-authorized distributors and dealers.

† System parameters are factory-set per order.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1200 Controller Features, Continued

Programmable Inputs

- Forced transfer to OFF (programmed-transition models only; requires load shed accessory)
- Inhibit transfer
- Low battery voltage (external battery supply module required)
- Peak shave/area protection input
- Remote common fault
- Remote test
- Remote end time delay
- Remotely monitored inputs, four (4) available

Programmable Outputs

- Alarm silenced
- Audible alarm
- Chicago alarm control
- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- Generator engine start, source E
- I/O module faults
- In-phase monitor synch
- Load bank control
- Load control active (pre/post transfer delay, up to 9 outputs)
- Loss of phase fault, source N and E
- Low battery fault (external battery supply module required)
- Maintenance mode
- Non-emergency transfer
- Not in automatic mode
- Over/undervoltage faults, source N and E
- Peak shave/area protection active
- Phase rotation error, source N and E
- Preferred source supplying load
- Software-controlled relay outputs (four maximum)
- Source available, preferred and standby
- Standby source supplying load
- Test active
- Transfer switch auxiliary contact fault
- Transfer switch auxiliary contact open
- Voltage unbalance, source N and E

Voltage and Frequency Sensing		
Parameter	**Default**	**Adjustment Range**
Undervoltage dropout	90% of pickup	75%- 98%
Undervoltage pickup	90% of nominal	85%- 100%
Overvoltage dropout *	115% of nominal*	106%- 135%
Overvoltage pickup	95% of dropout	95%- 100%
Unbalance enable	Disable	Enable/Disable
Unbalance dropout	20%	5%- 20%
Unbalance pickup	10%	3%- 18%
Voltage dropout time	0.5 sec.	0.1- 9.9 sec.
Underfrequency dropout †	99% of pickup	95%- 99%
Underfrequency pickup †	90% of nominal	80%- 95%
Overfrequency dropout †	101% of pickup	101%- 115%
Overfrequency pickup †	110% of nominal	105%- 120%
Frequency dropout time †	3 sec.	0.1- 15 sec.
* 690 volts, maximum. Default = 110% for 600 volt applications.		
† Emergency source only		

Adjustable Time Delays		
Time Delay	**Default**	**Adjustment Range**
Engine start	3 sec.	0- 6 sec. †
Engine cooldown	5 min.	0- 60 min.
Fail to acquire standby source	1 min.	
Transfer, preferred to standby	3 sec.	
Transfer, standby to preferred	15 min.	
Transfer, off to standby	1 sec.	1 sec. - 60 min.
Transfer, off to preferred	1 sec.	
Fail to synchronize	60 sec.	10 sec - 15 min.
Auto load test termination after transfer	1 sec.	1 sec.- 60 min.
Load Control Time Delays:		
Pretransfer to preferred	0 sec.	0- 60 min.
Post-transfer to preferred	0 sec.	
Pretransfer to standby	0 sec.	
Post-transfer to standby	0 sec.	
Note: Time delays are adjustable in 1 second increments, except as noted.		
† Engine start time delay can be extended to 60 minutes with an External Battery Supply Module Kit.		

Accessory Modules

The mounting kit holds up to five optional modules.

Module Current Draw Specifications, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100
Maximum Total Current *	300
* If an External Battery Module is installed, there is no current restriction.	

❑ Standard Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	6
Contact Type	Form C (SPDT)
Contact Voltage Rating	2 A @ 30 VDC 500 mA @ 125 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG

❑ High-Power Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Voltage Rating	12 A @ 24 VDC 12 A @ 250 VAC 10 A @ 277 VAC 2 A @ 480 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Environmental Specifications	
Temperature	- 40°C to 85°C (- 40°F to 185°F)
Humidity	35% to 85% noncondensing

❑ Alarm Module

- 90 dB Audible alarm
- Any alarm function can be programmed to trigger the audible alarm
- Chicago alarm function
- Preferred source selection
- Supervised transfer control (supervised transfer control switch required)
- Connection for external alarm

External Alarm Connection Specifications	
Wire Size	#12- 22 AWG Cu
Contact Voltage Rating	500 mA @ 120 VAC
	250 mA @ 240 VAC

❑ External Battery Supply Module

- Energizes the ATS controls using an external battery when no source power is available
- Allows extended engine start time delays
- Allows the use of any combination of accessory modules (no current draw restriction, maximum of five modules total)
- Connects to one or two batteries, 12 VDC or 24 VDC system
- Current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC
- Provides low external battery voltage indication to the transfer switch controller
- Reverse-polarity protected

Other Controller Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

❑ Controller Disconnect Switch

- Disconnects power to the controller without disconnecting the load
- Mounts inside the enclosure

❑ Current Sensing Kit

- Monitor current on all phases with 1% accuracy

❑ Digital Meter

- Measure and display voltage, current, frequency, and power
- 35 programmable alarms
- LCD display, 67 x 62.5 mm (2.65 x 2.5 in.)
- Pushbutton operation
- Password- protected programming menus
- Two digital inputs
- Two digital outputs
- Two Form A relay outputs
- Serial port for optional network connections
- Data logging
- Factory- installed

❑ Ethernet Communications

- RJ-45 connector
- Supports Internet Protocol version 4 (IPv4)
- Supports Modbus TCP/IP protocol

❑ Load Shed Kit

- Forced transfer from Emergency to OFF for programmed-transition and closed-transition models
- Customer-supplied signal (contact closure) is required for the forced transfer to OFF function
- Factory-installed and loose kits available for models KCC and KCP
- Factory-installed only for other programmed-transition and closed-transition models

❑ Padlockable User Interface Cover

- Provides additional protection against unauthorized access
- Cover standard on NEMA 3R enclosures

❑ RSA III Remote Serial Annunciator

- Monitors the generator set
- Monitors ATS common alarm, Normal source, and Emergency source status and connection
- Allows remote testing of the ATS
- For more information about RSA III features and functions, see specification sheet G6- 139

❑ Supervised Transfer Control Switch

- Standard on models with non-automatic controls
- Optional for models with automatic controls
- Auto, manual, and transfer positions
- Automatic and non-automatic modes
- Alarm module required

Supervised Transfer Control Switch Operation for Automatic and Non-Automatic Transfer Switches

Switch Position	Automatic Switches	Non-Automatic Switches
AUTO	• Automatically transfers to the standby source, when available, if the preferred source is lost. • Transfers back to the preferred source when it becomes available.	
MANUAL	• Automatically transfers to an available source if the connected source is lost. • Test, peak shave, and loaded exercise commands will transfer to the standby source. • Does not automatically transfer back to preferred when both sources are available.	• Does not automatically transfer to an available source when the connected source is lost. • Test, peak shave, and loaded exercise commands are ignored. • Does not automatically transfer back to preferred when both sources are available. • Transfers only when the switch is manually moved to the TRANSFER position as described below.
TRANSFER (momentary switch position)	• Does not initiate an engine start sequence. Generator set engine must be signalled to start by an event such as a loss of utility, loaded test, loaded exercise, etc. • Allows transfer to the other source, if available. An event such as a loss of utility, loaded exercise, or loaded test must first initiate the transfer sequence. • Time delays will operate. Wait for time delays to expire, or press the End Time Delay button. • Operates pre- and post-transfer load control time delays if both sources are available. • MANUAL TRANSFER is displayed when the ATS is ready to transfer.	

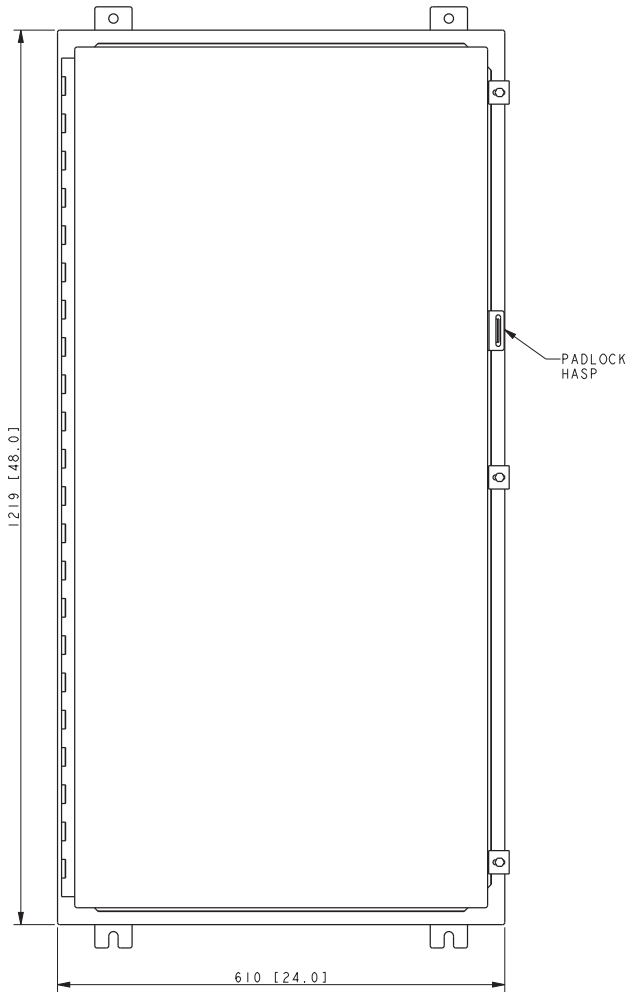
KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

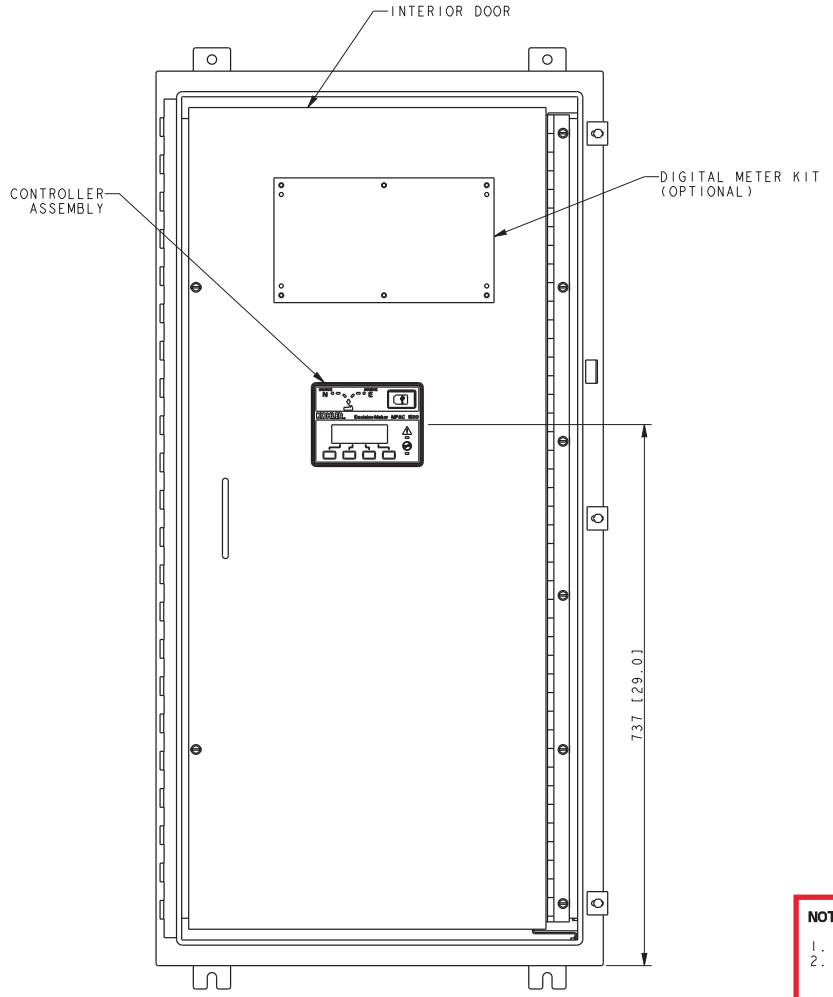
Main Board I/O Specifications	
Output contact type	Isolated form C (SPDT)
Output contact rating	1 amp @ 30 VDC, 500 mA @120 VAC
I/O terminals wire size	#12-24 AWG

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® Power Systems distributor for availability.



FRONT VIEW
610 [24.0] MINIMUM DOOR SWING SPACE REQUIRED



FRONT VIEW
WITH OUTER DOOR REMOVED

NOTES:

1. DIMENSIONS IN [ ] ARE INCHES.
2. FINISH:
   NEMA 4 & 12: ANSI 49 GRAY.
   NEMA 4X: STAINLESS STEEL.
3. DOOR CLAMPS VARY WITH NEMA TYPE.
4. REFER TO OPERATOR'S MANUAL PRIOR TO INSTALLATION & OPERATION OF SWITCH.

SEE ADV-8565 FOR FULL MODEL CODE DEFINITION

STYLE	MECHANISM	TRANSITION	MPAC LOGIC	VOLTS	POLES	NEUTRAL	ENCLOSURE	AMPS	CONNECTION
KCS	STANDARD	STANDARD	1200, 1500	208-480	2,3,4	SOLID,SW	4,4X,12	230	STANDARD
KSS	SPECIFIC BREAKER	STANDARD	1200	208-480	2,3,4	SOLID,SW	4,4X,12	230	STANDARD

REV	DATE	REVISION	BY
-	8-15-13	NEW DRAWING [CT54441]	BTW
A	7-12-17	BRANDING DECALS REMOVED [CT176469]	BTW
B	12-14-20	(A-7) ADDED ROW FOR KSS; (A-5) REMOVED OVLP FROM KCS [CT208031]	ZHK

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
SURFACE FINISH 63 MAX.
THIRD ANGLE PROJECTION

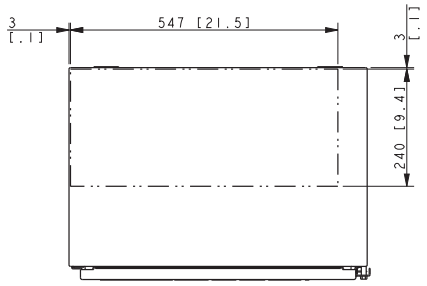
APPROVALS		DATE
DRAWN	BTW	8-15-13
CHECKED	BTW	8-15-13
APPROVED	MTL	8-15-13

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

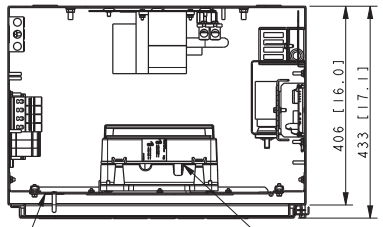
TITLE: DIMENSION PRINT

SCALE NONE | CAD NO. | SHEET 1 of 2

DWG NO. ADV-8569 | D

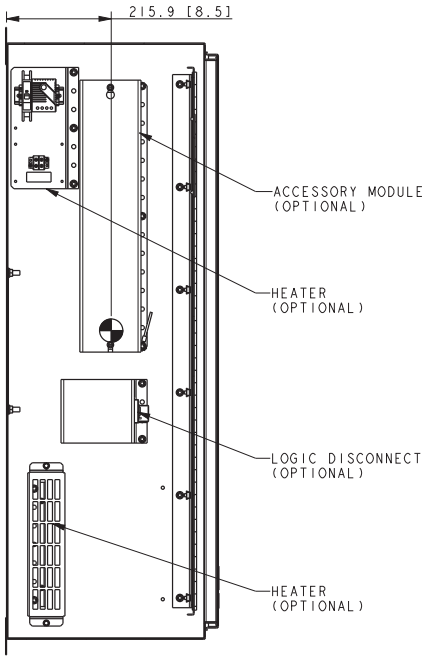


RECOMMENDED ENTRANCE AREA
TOP & BOTTOM

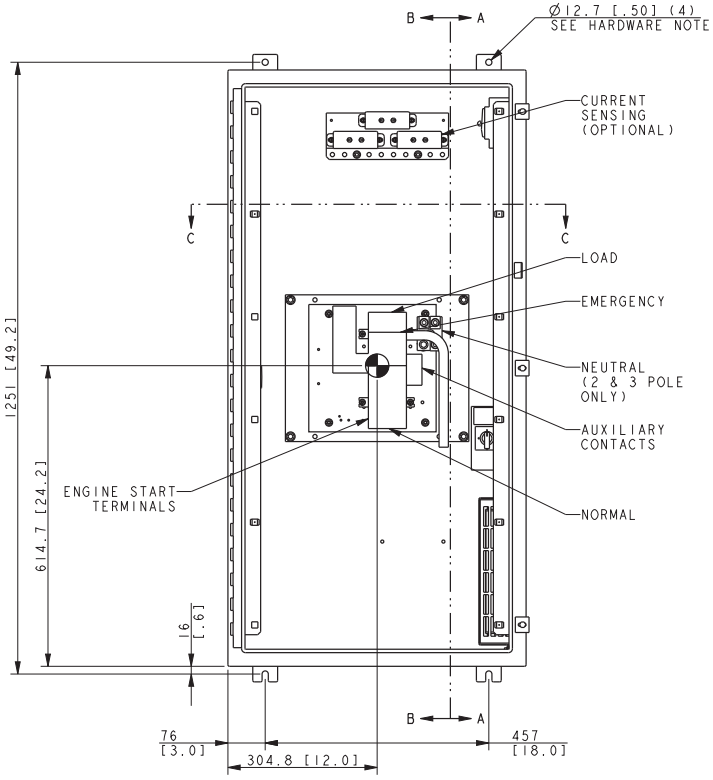


SECTION C-C

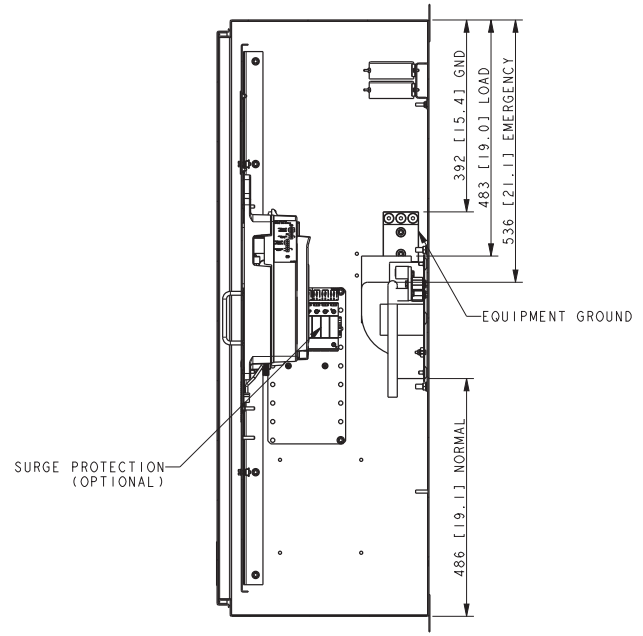
FOR SEISMIC CERTIFIED UNITS,
MOUNT WITH THE FOLLOWING HARDWARE:
Ø9.53 [.375] BOLT (4)
Ø25.4 [1.00] X 2.1 [.083] THICK WASHER (4)
HARDWARE TO COMPLY WITH SPECIFICATIONS
ON ADV-7456.



SECTION A-A



FRONT VIEW
DOORS NOT SHOWN



SECTION B-B

SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTION			
SWITCH RATING (AMPS)	RANGE OF AL-CU WIRE SIZES		
	CONTACTOR (PER PHASE)	NEUTRAL	GROUND
230	(1) #14 TO 4/0 (Cu ONLY)	(3) #14 to 4/0 (Cu ONLY)	(3) #6 TO 3/0

WEIGHTS KG [LBS]		
2 POLE	3 POLE	4 POLE
62 [137]	66 [146]	69 [153]

REV	DATE	REVISION	BY
-	8-15-13	NEW DRAWING [CT54441]	BTW
A	7-12-17	BRANDING DECALS REMOVED [CT176469]	BTW
B	12-14-20	(A-7) UPDATED TABLE; (B-4) ADDED NOTE; (C-2) REMOVED NEUTRAL; (C-1) UPDATED DIMESION; (B-5,8) ADDED CG; [CT20803I]	ZHK

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN BTW	8-15-13
CHECKED BTW	8-15-13
APPROVED MTL	8-15-13

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POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIMENSION PRINT
SCALE NONE | CAD NO. | SHEET 2 of 2
DWG NO. ADV-8569 | D

REV	DATE	REVISION	BY
–	12-9-20	NEW DRAWING [CT207889]	SMH

PHYSICAL

DOOR

MEMBRANE SWITCH

LCD DISPLAY

STANDARD ON MPAC1500
OPTIONAL ON MPAC1200

ETHERNET INTERFACE

MPAC POWER/
CONTROL BOARD

P14 P17 P9

P16 (OPTION BOARDS)

TB2 MODBUS

P12 USB PORT

TB1 PROGRAMMABLE INPUTS/OUTPUTS

SW1 PASSWORD DISABLE / POWER DISABLE / SPARE

P2 PROGRAMMED TRANSITION

K1

K2

P3 CURRENT SENSING (OPTIONAL)

LEGENDS

BID – BYPASS/ISOLATION DISPLAY
BP – BYPASS SWITCH
CR(#) – BRIDGE RECTIFIER
IP(#) – ISOLATION PLUG ASSEMBLY
IS – ISOLATION (TRANSFER SWITCH CARRIAGE POSITION)
J(#) – CONNECTOR (JACK)
K(#) – RELAY
LCD – LIQUID CRYSTAL DISPLAY
P(#) – CONNECTOR (PLUG)
SL(#)– SOLENOID LOCK RELAY
SW1 – DIP SWITCH
TB1 – MPAC PROGRAMMABLE INPUT/OUTPUT TERMINAL BLOCK
TB1–(#) – TRANSFER SWITCH TERMINAL BLOCK
TB2 – MPAC MODBUS TERMINAL BLOCK
TBF – FIELD CONNECTION TERMINAL BLOCK
TS – TRANSFER SWITCH

30,70,104,150, 200, & 230 AMPS

OPTIONAL SWITCHING NEUTRAL

EMERGENCY LOAD

LA LB LC LN

EA EB EC EN

TS COIL A B CKT

71 9 70 6

72 8 69 7

TB/TS

ENGINE START CONTACTS TO SHEET 3

O14 O15 O16

17 15

16 18 14

4 19 5 EN

20 21 22 LN

1 2 3 NN

NA NB NC NN

35 33 36 34

31 29 32 30

13 11 12 10

OPTIONAL TS AUXILIARY CONTACTS ACCESSORY

TS AUXILIARY CONTACTS FEATURE

NORMAL

SINGLE PHASE
OMITS B PHASE

P1

P

P CONNECTIONS (CONTACTOR TO MAIN LOGIC BOARD)

PIN #					
1	1	(TS–8)	13	13	(TS–16)
2	2	(TS–A)	14	14	(TS–18)
3	3	(TS–6)	15	15	(TS–70)
4	4	(TS–3)	16	16	(TS–72)
5	5	(TS–B)	17	N/C	.
6	6	(TS–5)	18	18	(TS–19)
7	7	(TS–4)	19	19	(TS–20)
8	8	(TB/TS–14)	20	20	(TS–21)
9	9	(TB/TS–15)	21	21	(TS–22)
10	10	(TS–17)	22	22	(TS–NN)
11	11	(TS–2)	23	23	(TS–EN)
12	12	(TS–1)	24	24	(TS–LN)

MODEL KSS
SPECIFIC MECHANISM
STANDARD TRANSITION
30–230A, 1 & 3 PHASE

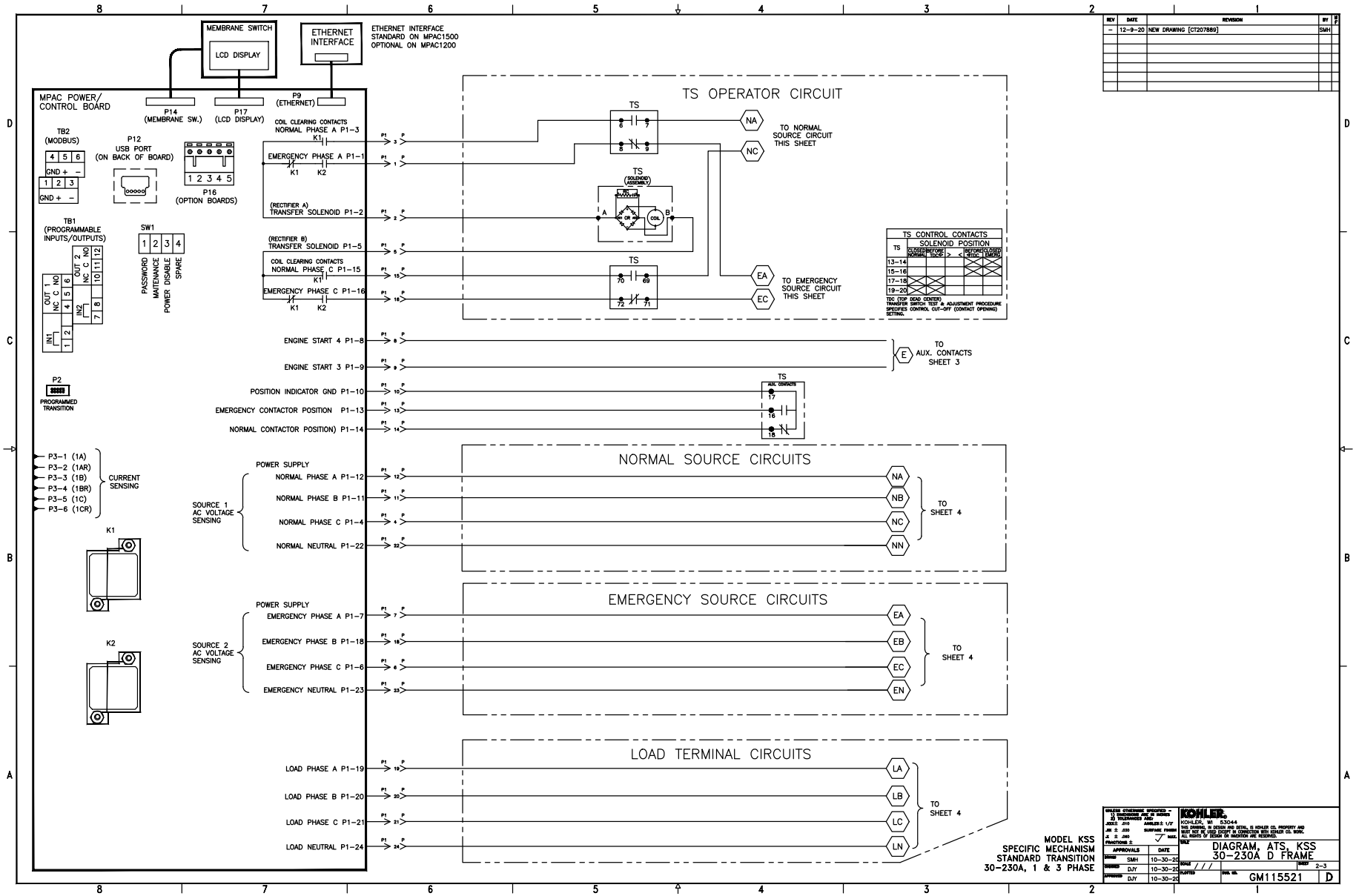
KOHLER.
KOHLER, WI 53044

APPROVALS	DATE
SMH	10-30-20
DJY	10-30-20
DJY	10-30-20

TITLE: DIAGRAM, ATS, KSS 30–230A D FRAME

SCALE: / / / SHEET 1–3

DRAWING NO. GM115521 D



REV	DATE	REVISION	BY	# F
–	12-9-20	NEW DRAWING [CT207889]	SMH	

MODEL KSS
SPECIFIC MECHANISM
STANDARD TRANSITION
30-230A, 1 & 3 PHASE

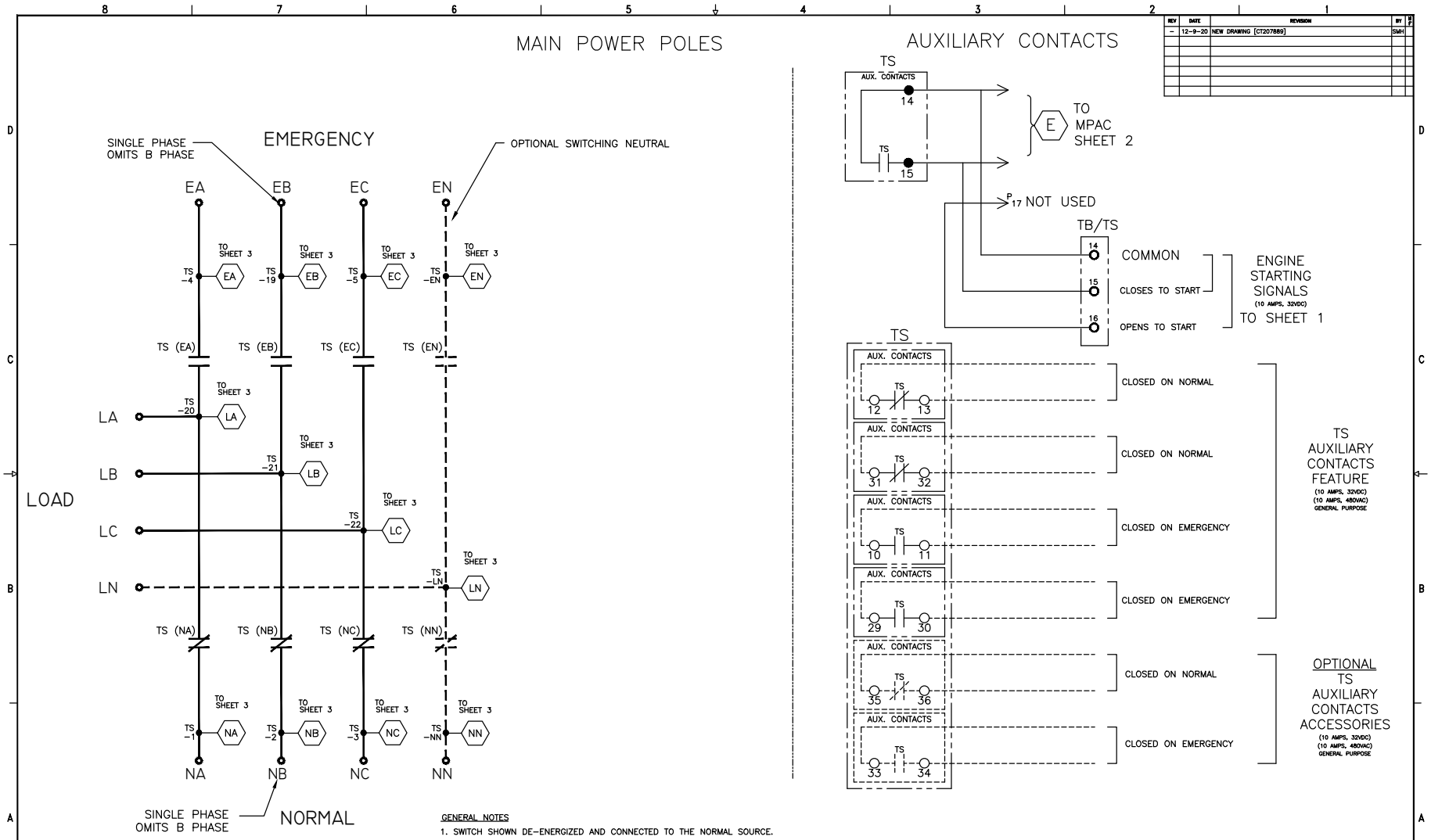
KOHLER Co.
KOHLER, WI 53044

APPROVALS	DATE
SMH	10-30-20
DJY	10-30-20
DJY	10-30-20

DIAGRAM, ATS, KSS
30-230A D FRAME

SHEET 2-3

GM115521 D



REV	DATE	REVISION	BY
–	12-9-20	NEW DRAWING [CT207889]	SMH

GENERAL NOTES

1. SWITCH SHOWN DE-ENERGIZED AND CONNECTED TO THE NORMAL SOURCE.
2. ALL WIRING IS #16 AWG, TINNED, STRANDED COPPER UNLESS OTHERWISE INDICATED.

MODEL KSS
SPECIFIC MECHANISM
STANDARD TRANSITION
30-230A, 1 & 3 PHASE

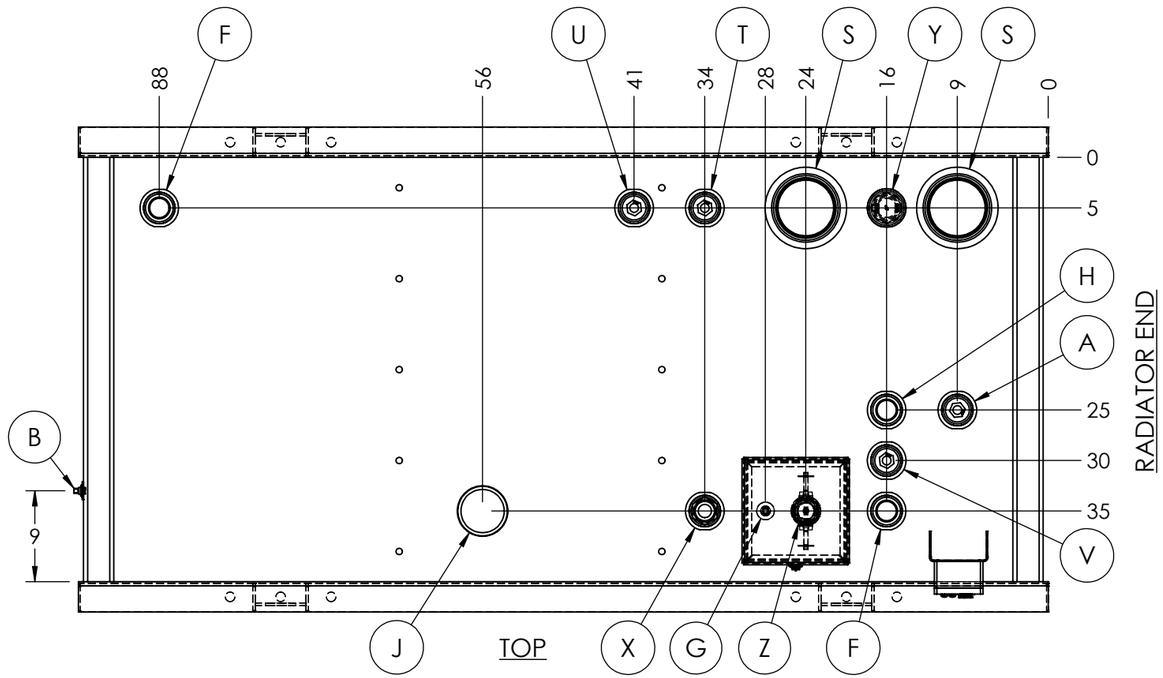
KOHLER Co.
KOHLER, WI 53044

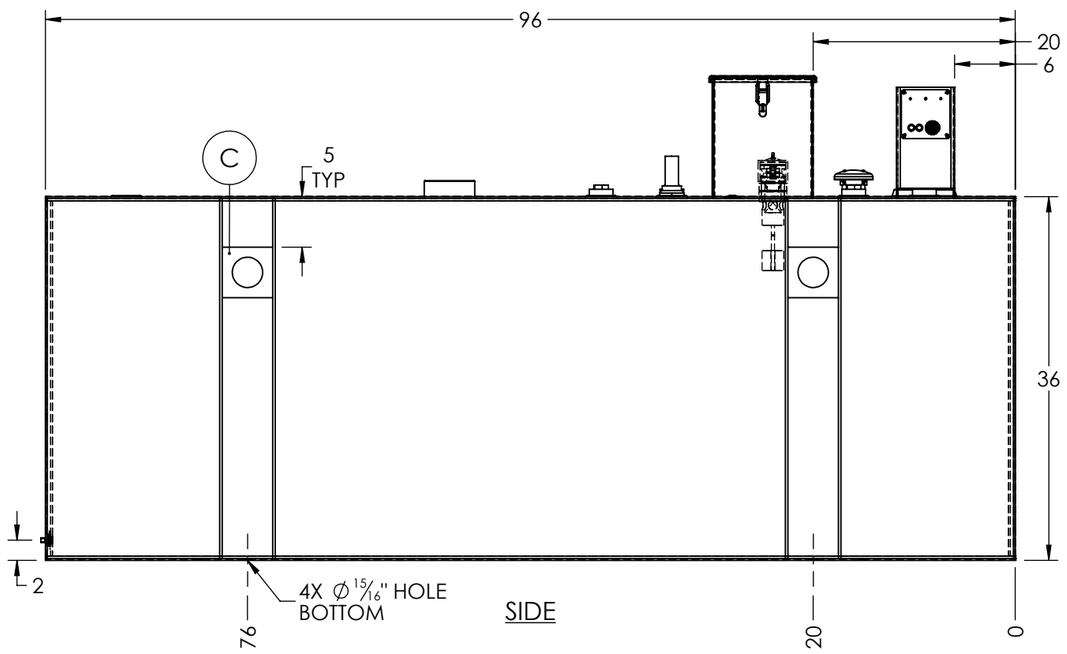
APPROVALS	DATE
SMH	10-30-20
DJY	10-30-20
DJY	10-30-20

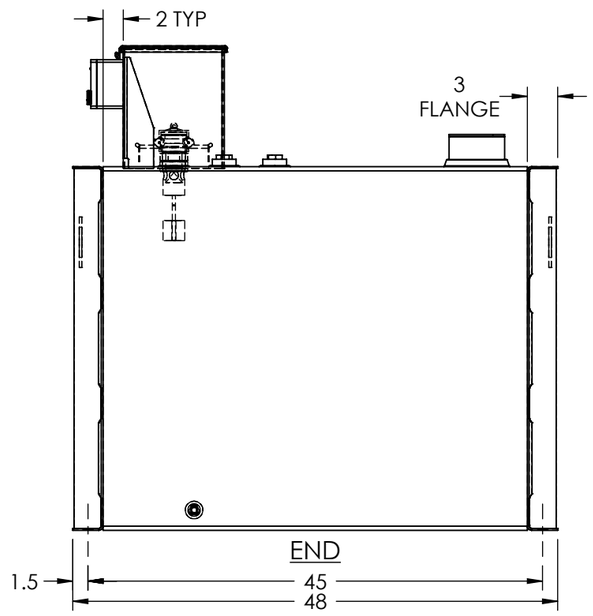
TITLE: DIAGRAM, ATS, KSS 30-230A D FRAME
SHEET 3-3
DWG NO. GM115521 D

JOB #	TANK CAPACITY ACTUAL	TANK CAPACITY USEABLE	TANK WEIGHT	GENSET MODEL	GENSET FOOTPRINT
37463	418 GAL	400 GAL	1,650 LBS	X	X

APPROVED BY: **DATE:**







BILL OF MATERIALS

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
S	3165	FLANGE, 5", EMERGENCY VENT	2
T	3650R	FLANGE, 2", FUEL RETURN W/ 1/2" DIP TUBE	1
U	3650S	FLANGE, 2", FUEL SUPPLY W/ 1/2" DIP TUBE	1
	700-1065	1/2" SPRING CHECK VALVE	1
V	1000	FLANGE, 2", LOW LEVEL ALARM (SET AT 19-1/2")	1
	1010	HIGH LEVEL ALARM (SET AT 5-1/4")	1
X	1001	FLANGE, 2", KRUEGER FUEL LEVEL GAUGE (SET AT 33")	1
Y	3152	FLANGE, 2", STANDARD VENT CAP	1
Z	3155CB	H. COUPLING, 2", CLAY & BAILEY OVERFILL PREVENTION VALVE	1
	3350	2" SCULLY FILL CONNECTOR	1
A	4300	FLANGE, 2", FUEL IN BASIN ALARM	1
B	3502	FLANGE, 1/2", BASIN DRAIN	1
C	8410	1/4" FLUSH MOUNT LIFTING PLATE	4
F	3195	FLANGE, 2", EXTRA FITTING W/ PLUG	2
G	3190	FLANGE, 3/8", EXTRA FITTING W/ PLUG	1
H	1020	FLANGE, 2" CRITICAL HIGH LEVEL ALARM (SET AT 3-3/4")	1
J	SPECIAL	H. COUPLING, 4", FUELTEC FUEL POLISHING SYSTEM (SHIP LOOSE)	1
	AFP4	FOUR ALARM FILL PANEL W/ RELAYS	1
	AFP4I	MOUNT & WIRE ALARM PANEL BY FILL	1
	8200	5 GALLON SPILL CONTAINMENT	1
DW-101		DOUBLE WALL SECONDARY CONTAINMENT	
PAINT COLOR		GLOSS BLACK (9638)	

NOTE:
1. FUELTEC FUEL POLISHER ENCLOSURE UPGRADED TO 316 STAINLESS STEEL
2. WEIGHT EXCLUDES FUELTEC FUEL POLISHER
3. FUELTEC FUEL POLISHER HIDDEN FOR CLARITY

REVISIONS

REV.	DESCRIPTION	DATE	BY

GLOBAL POWER COMPONENTS™
2300 S. 51st ST
MILWAUKEE, WI 53219
PH 414.475.3000 FAX 414.475.3441
www.globalpowercomponents.com

Underwriters Laboratories® Inc. Listed
MH18481
FILE NO. MH46743
MH25279

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
THE TOLERANCES ARE:
ONE PLACE .X ± .1
TWO PLACE .XX ± .06
ANGLE ± 2°
HOLE DIA. ± .005

THIRD ANGLE PROJECTION

CUSTOMER NAME: LOFTIN EQUIPMENT
JOB REFERENCE: SABINE RIVER
DRAWING REFERENCE: X

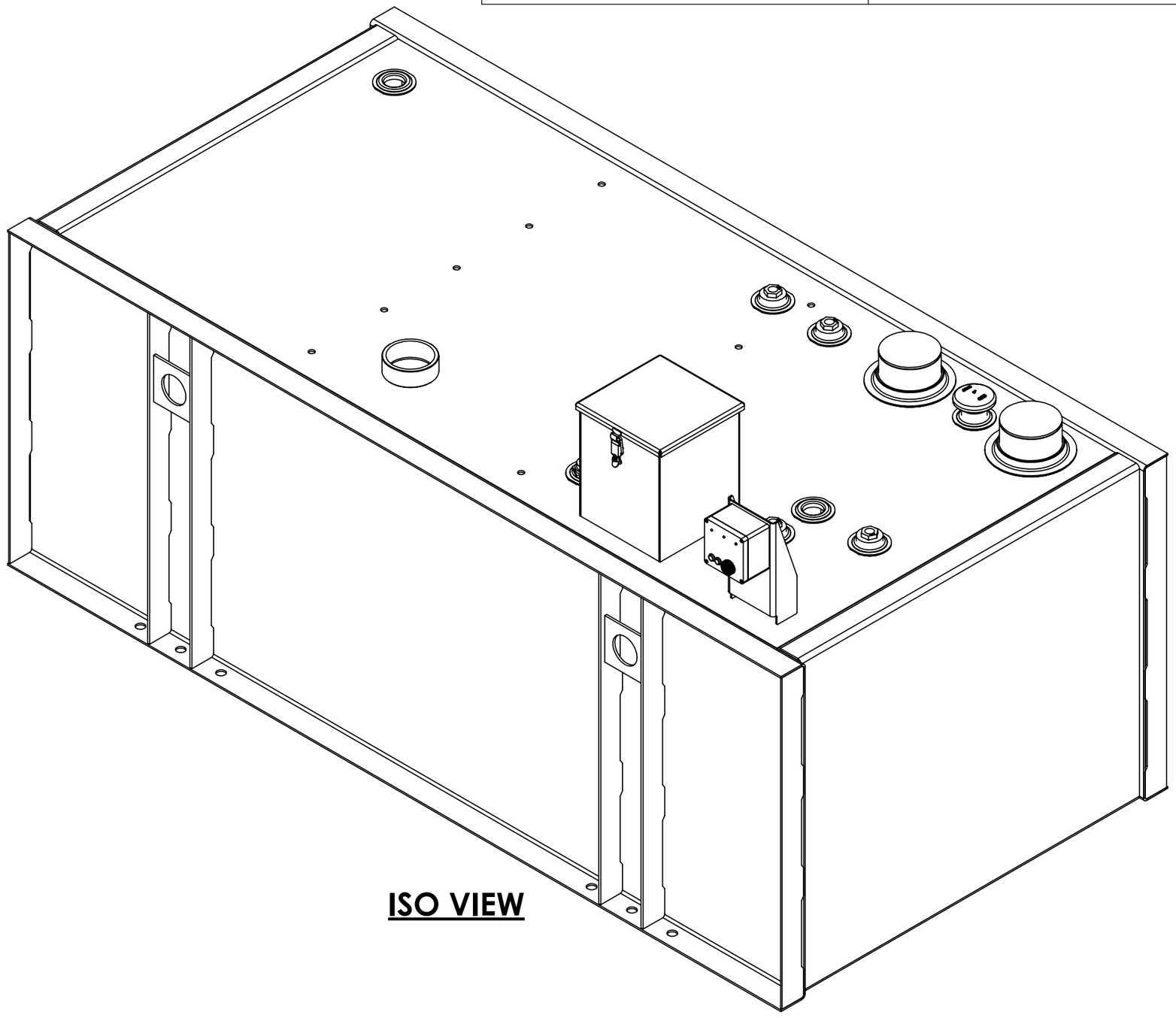
DATE: 10/14/2022
DRAWN BY: RDG

DESCRIPTION: **FREESTANDING TANK WITH RUPTURE BASIN**
SIZE: **B**
DWG. NO.: **15-37463**
REV.:
SCALE: 1:15

JOB #
37463

APPROVED BY:

DATE:



ISO VIEW

GLOBAL POWER COMPONENTS™
2300 S. 51st ST
MILWAUKEE, WI 53219
PH 414.475.3000 FAX 414.475.3441
www.globalpowercomponents.com

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MH18481
FILE NO. MH46743
MH25279

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
THE TOLERANCES ARE:
ONE PLACE .X ± .1
TWO PLACE .XX ± .06
ANGLE ± 2°
HOLE DIA. ± .005

THIRD ANGLE PROJECTION

CUSTOMER NAME: LOFTIN EQUIPMENT

JOB REFERENCE: SABINE RIVER

DRAWING REFERENCE: X

DATE: 10/14/2022

DRAWN BY: RDG

DESCRIPTION: **FREESTANDING TANK WITH RUPTURE BASIN ISO VIEW**

SIZE: **B**

DWG. NO.: **15-37463**

REV.:

SCALE: 1:10