

PROJECT MANUAL

Including Specifications
for Construction of:

THE COUNTY OF MENDOCINO

SHERIFF ADMINISTRATION MAIN SERVICE REPLACEMENT AND GENERATOR

951 Low Gap Road
Ukiah, CA 95482



Prepared by:
FACILITIES & FLEET DIVISION
851 LOW GAP ROAD
UKIAH, CA 95482
Tel: (707) 234-6054

BID 41-20

Date of Issue:
November 6, 2020

SECTION 00002

PROJECT DIRECTORY

OWNER: County of Mendocino
Sheriff's Office
951 Low Gap Road
Ukiah, CA 95482

AGENT: Mendocino County Executive Office
Facilities and Fleet Division
851 Low Gap Road
Ukiah, CA 95482
(707) 234-6054
Doug Anderson, Assistant Facilities Manager

ENGINEER: Brokaw Design
P.O. Box 3103
Rohnert Park, CA 94928
(707) 536-6635
Michael Burke – Electrical
Tim Lengyel – Structural

SECTION 00005

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END OF SECTION 00005

SECTION 00020

NOTICE INVITING BIDS

Notice is hereby given that sealed bids will be received at the Executive Office, Facilities and Fleet Division, County of Mendocino, 851 Low Gap Road, Ukiah, California 95482 until the hour of 2:00 p.m., as determined by the clock on the wall of the Facilities and Fleet Division Office, County of Mendocino, on Wednesday December 9th, at 2:00 PM and then publicly opened and read aloud in the Executive Office, Facilities and Fleet Division, County of Mendocino, 851 Low Gap Road, Ukiah, California for the following project:

Mendocino County BID 41-20
SHERIFF ADMINISTRATION MAIN PANEL REPLACEMENT AND
GENERATOR PROJECT

License required for this Project is: "A or B" License

Electronic Plans and Documents may be seen or downloaded from the Mendocino County Web Page for Open RFP, Quotes & Bids:

<https://www.mendocinocounty.org/government/executive-office/open-rfp-quotes-bids>.

Additionally plans and documents have been distributed to builder's exchange plan rooms throughout Northern California. For printed plans in Mendocino County, electronic copies of the plans and documents have been supplied to:

Creative Workshop
759 S. State St.
Ukiah, CA 95482
707-468-0251

Bids shall be made on a form provided by the County and accompanied by a Certified Check, Cashier's Check, or Bidder's Bond for ten percent (10%) of the amount bid, made payable to the County of Mendocino. The above-mentioned check or Bid Bond shall be given as a guarantee that the Bidder shall execute the contract if it be awarded to it in conformity with the contract documents and shall provide the surety bond or bonds required, sign the contract and commence work as set forth in the Instructions to Bidders of the contract documents.

The successful Bidder will be required to furnish a Labor and Material Bond and a Faithful Performance Bond in an amount equal to one hundred percent (100%) of the contract price. Bonds shall each be obtained from a surety company satisfactory to the County of Mendocino.

Federal Laws, including The Davis-Bacon Act and The Americans with Disabilities Act of 1990, are applicable to the project.

Bidders' attention is called to Instruction to Bidders and other related documents for full directions and information as to bidding and other requirements.

Pursuant to California Public Contract Code Section 22300, the Contractor may substitute securities for any money withheld by the County to insure performance under the Contract. Said securities shall be in a form and of a type acceptable to the County.

A mandatory pre-bid conference and site inspection will be held on Thursday, November 19 2020, @ 9:00 AM at the Project site, 951 Low Gap Road, Ukiah, California 95482.

PAYMENT OF PREVAILING WAGES

Pursuant to the provisions of the Labor Code of the State of California, the Department of Industrial Relations has made a determination of the rate of per diem wages to be paid on the prevailing rate of pay for regular, holiday and overtime work in the locality in which the public work is to be performed, for each craft, classification, or type of workman needed to execute the contract. All County of Mendocino projects greater than \$1,000 require that contractors adhere to Prevailing Wage requirements (California Labor Code, Sections 1770 through 1775). The rates can be found online here:

<https://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>.

CONTRACTOR REGISTRATION

Per Labor Code Section 1771.1(a) A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

CERTIFIED PAYROLL RECORDS

Per Labor Code Section 1776 each contractor and subcontractor shall keep accurate payroll records. A certified copy of all payroll records for work performed under this contract shall be furnished upon request to a representative of the awarding body. Per SB 854 contractors and subcontractors are required to furnish certified payroll reports directly to the Department of Industrial Relations.

EMPLOYMENT OF APPRENTICES

Each contractor and subcontractor performing work in an apprenticeable craft or trade shall comply with Section 1777.5 relating to Apprentices on public works projects.

MENDOCINO COUNTY BUSINESS LICENSE

Pursuant to Mendocino County Code Section 6.0 – Business Licenses and Regulations, at the time of contract award, the contractor shall supply a copy of their current County of Mendocino business license.

LAWS AND GOVERNANCES

In the performance of the work contemplated by this contract, the contractor shall conform to and abide by all labor requirements and provisions of State and Federal Laws and City and County Ordinances and Regulations which may in any manner affect those engaged or employed on the work project, including but not limited to the overtime provisions of the Labor Code section 1813 and 1815 of the State of California.

END OF SECTION

SECTION 00100

INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 BIDS RECEIVED

- A. Sealed bids for the **Sheriff Administration Main Service Replacement and Generator Project (BID 41-20)** will be received at the Facilities and Fleet Division Office, County of Mendocino, 851 Low Gap Road, Ukiah, California, until 2:00 p.m. as determined by the clock on the wall of the Facilities and Fleet Division Office, on Wednesday December 9, 2020 at 2:00PM, and then publicly opened and read aloud in the Facilities and Fleet Division Office, County of Mendocino.
- B. Late bids will not be accepted. It is Bidder's responsibility to assure that its bid is delivered and received at the location noted above on or before the date and hour set for the bid opening.

1.2 LICENSE REQUIREMENT

- A. The license required for this Project is “A or B” License.
- B. Pursuant to Mendocino County Code Section 6.0 – Business Licenses and Regulations, at time of contract award, the contractor shall supply a copy of their current County of Mendocino business license.

1.3 SECURING OF PLANS AND DOCUMENTS

Electronic Plans and Documents may be seen at, or downloaded from the Mendocino County Web Page for Bidding Opportunities – Construction:
<https://www.mendocinocounty.org/government/executive-office/open-rfp-quotes-bids>

Additionally plans and documents have been distributed to builder's exchange plan rooms throughout Northern California. In Mendocino County, printed plans may be obtained from:

Creative Workshop
759 S. State St.
Ukiah, CA 95482
707-468-0251

1.4 BIDS

Bids, to be considered, must be in accordance with the following instructions:

- A. Bids must be submitted on the bid form provided by County, properly and completely filled out with numbers stated both in writing and in figures and with signatures of all persons signing in longhand/cursive.
- B. The completed form shall be without erasures or interlineation and shall not contain recapitulations of the work to be done. Only written proposals will be permitted.
- C. A Bid Bond or Certified Cashier's Check made payable to the County of Mendocino for an amount equal to at least ten percent (10%) of the bid amount shall accompany each bid. Such guaranty to be forfeited should the Bidder to whom the contract is awarded fail to enter into the contract.

1.5 PRE-BID CONFERENCE AND SITE ACCESS

- A. A mandatory pre-bid conference will be held, Thursday November 19, 2020 @ 9:00 AM at the site, 951 Low Gap Road, Ukiah, California. Following the meeting, a site review will be conducted to acquaint Bidders with the Project.
- B. The County reserves the right to schedule an additional mandatory pre-bid conference to ensure adequate bid representation.
- C. Failure to attend at least one of the pre-bid conferences will disqualify a non-attending bidder from the bid.

1.6 SUBCONTRACTORS LISTED

- A. In accordance with California Public Contract Code Sections 4100 et seq., inclusive, each bidder shall provide a list of subcontractors (Section 00430), giving the name and location of place of business and contractor's license number of each subcontractor who will perform a portion of the contract work in an amount in excess of one-half of one percent (0.5%) of the total contract price. In each instance, the nature and portion of the work to be subcontracted shall be described.
- B. Failure of Bidder to specify a subcontractor for any portion of the work in an amount in excess of one-half of one percent (0.5%) of the total contract price constitutes an agreement for Bidder to perform that portion of the work itself. After bids are opened, no subcontractor may be designated or substituted except as provided for in Sections 4107 et seq. of the Public Contract Code.
- C. All Bidders must supply with their Bids the required information on all subcontractors who will perform any portion of the work including labor, rendering of service or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one-half of one percent (0.5%) of

total bid. Violation of this requirement may result in Bid being deemed non-responsive and not being considered.

1.7 AWARD OR REJECTION OF BIDS

The contract shall be awarded to the lowest responsible bidder complying with these instructions, provided the bid is deemed reasonable and in the best interest of the County of Mendocino. County reserves the right to reject any and all bids, and to waive any informality on bids received whenever the rejection or waiver is in the best interest of County. The competency and dependability of the bidders will be considered when making the award.

Additive and Deductive Items: Method of Determining Lowest Bid. Pursuant to Public Contract Code section 20103.8, if this bid solicitation includes additive and/or deductive items, the checked [X] method shall be used to determine the lowest bid: [check one]

☒ (a) The lowest bid shall be the lowest bid price on the base contract without consideration of the prices on the additive or deductive items.

☐ (b) The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items that were specifically identified in the bid solicitation or Bid Form as being used for the purpose of determining the lowest bid price.

☐ (c) The lowest bid shall be the lowest total of the bid prices on the base contract and those additive or deductive items taken in order from a specifically identified list of those items that, when in the solicitation, and added to, or subtracted from, the base contract, are less than, or equal to, a funding amount publicly disclosed by the County before the first bid is opened.

☐ (d) The lowest bid shall be determined in a manner that prevents any information that would identify any of the bidders or the proposed Subcontractors or suppliers from being revealed to the public entity before the ranking of all bidders from lowest to highest has been determined.

*If no method is checked, sub-paragraph (a) shall be used to determine the lowest bid.

Notwithstanding the method used by the County to determine the lowest responsible bidder, the County retains the right to add to or deduct from the contract any of the additive or deductive items included in the bid solicitation.

The award of the contract, if awarded, is expected to be made within thirty (30) days and in no event later than eighty (80) days after the bid opening. After award, County shall notify the successful Bidder in writing, and forward with the notification original contracts for Bidder's execution. Within eight (8) working days after such notification, the successful Bidder shall return the signed contracts

to County, accompanied by all required Surety Bonds, insurance policies and endorsements.

1.8 TIME OF COMPLETION

Bidder agrees to commence work on or before a date to be specified in the written "Notice to Proceed" from County and to fully complete the project within One hundred eighty (180) calendar days from date of the written "Notice to Proceed".

1.9 ADDENDUM

Any addendum issued during the time of bidding and before bid opening shall be included in the bid. The addendum issued by County shall become part of the agreement. Questions to be considered for inclusion in an addendum must be in writing and in the hands of County not less than seven (7) days prior to bid opening date.

1.10 INTERPRETATION OF DRAWINGS AND DOCUMENTS

Should a Bidder find discrepancies in, or omissions from, the drawings or documents, or should it be in doubt as to their intent, it should at once notify County, which will then send responsive written instructions in the form of addenda to all Bidders. County will not be responsible for any oral instructions. Any verbal conversations with County during the bidding period are not to be construed as instructions. Any changes in the Contract documents will be issued by written addendum only.

1.11 WITHDRAWAL OF BID

Bids may be withdrawn prior to, but not later than, the time of bid opening.

1.12 BONDS

The successful Bidder is required to furnish a Labor and Material Payment Bond and a Performance Bond each in the amount equal to one hundred percent (100%) of the contract price. In addition, the successful Bidder is required to furnish a Bid Bond or Certified Cashier's Check made payable to the County of Mendocino for an amount equal to at least ten percent (10%) of the bid amount. Said Bonds shall be obtained from a surety company satisfactory to County.

1.13 SUBSTITUTIONS

Any substitution shall be made in accordance with instructions contained in Section 01340 – Submittals and Substitutions included herein. Questions concerning substitutions will not be entertained during the bidding period.

1.14 LIQUIDATED DAMAGES

In case of failure on the part of Contractor to complete the work within the time stipulated plus any duly authorized extension of time granted in writing by County, Contractor shall pay to County the sum of \$250.00 per calendar day for each day's delay beyond the time prescribed as liquidated damages, but not as a penalty. The language in the paragraph of the General Conditions entitled "Time of Completion and Liquidated Damages" is incorporated herein.

1.15 BIDDER'S QUALIFICATIONS

- A. All Bidders, Contractors and Subcontractors bidding under joint venture agreements shall be duly licensed as provided for under Sections 7000 et seq. of the Business and Professions Code.
- B. A corporation which is awarded the Contract will be required to furnish certification attesting to its corporate existence, as well as evidence that the Officer signing the contract is duly authorized to do so.
- C. Bidders and their subcontractors may be required to furnish evidence satisfactory to County that they have sufficient means and have had experience in the class of work called for to enable them to complete the contract in a satisfactory manner.
- D. No person, firm or corporation shall make or file or be interested in more than one bid for the same work, except insofar as alternate bids may be called for. No person, firm or corporation shall submit a collusive or sham bid or seek directly or indirectly to induce any other bidder to submit a collusive or sham bid or to refrain from submitting a bid or to seek in any way to control or fix the price of the bid or any portion of the bid price in order to secure an advantage against County or any other person interested in the proposed contract. However, a person, firm or corporation submitting a sub-proposal to a bidder or quoting prices on materials to a bidder is not hereby disqualified from submitting sub-proposals or quoting prices to other bidders.
- E. A licensed contractor shall not submit a bid to a public agency unless (1) its contractor's license number appears clearly on the bid, (2) the license expiration date is stated, and (3) the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information, or a bid containing information which is subsequently proven false, shall be considered non-responsive and shall be rejected by County.

1.16 EXAMINATION OF SITE AND DOCUMENTS

By submitting a bid, Bidder agrees and warrants that (1) it has examined the site and all documents, drawings and specifications; (2) it is satisfied that the same are adequate to produce the required results; and (3) its bid covers the cost of all items required in the agreement. The work to be performed includes all of the items

mentioned in these specifications and/or as shown on the plans and other documents included as a part of the project.

1.17 ENVIRONMENTAL AND PLANNING CONDITIONS OF APPROVAL

Bidder agrees to perform its work in conformance with all environmental and planning conditions of approval applicable to the project. Bidders' attention is directed to specification section 00801 Supplementary General Conditions and the source documents for specific conditions of approval

1.18 AGREEMENT

Contract documents include the Agreement which the successful Bidder, as Contractor, will be required to execute.

1.19 PRE-CONSTRUCTION CONFERENCE

The successful bidder shall be available for a pre-construction conference with County at a mutually convenient time.

1.20 QUALIFICATIONS OF BIDDERS

- A. The work to be performed under this contract is of a very specialized nature. It is the desire of County to secure the best work attainable and to maintain a very critical and condensed schedule. Bidders considered for award will be limited to those firms who can show to the satisfaction of County that they have the facilities and experience necessary to perform the required construction in accordance with specifications proposed for this project. The terms under which bidders will be evaluated and the rules that will be applied are attached to the bid documents herein as Section 00120, "Qualification Application".
- B. All employees of the Contractor and all subcontractors working within the Mendocino County Jail site will be required to clear a background check by the Mendocino County Sheriff's office. At least seven days prior to the start of work, the contractor is required, for each employee, to submit the employee's Name, Date of Birth, Social Security Number and Driver's License state and number. Only those employees clearing the Sheriff's Department background check will be permitted on site.

END OF SECTION

SECTION 00306

ANTITRUST CLAIM ASSIGNMENT

Pursuant to California Labor Code Section 7103.5, the following certification is hereby set forth and made a part of these specifications:

In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties.

SECTION 00307

NON-COLLUSION AFFIDAVIT

In accordance with California Public Contract Code Section 7106, the following affidavit must be completed by the Bidder:

Non-Collusion Affidavit to be executed by Bidder
and submitted with bid

State of California)
) ss.
County of Mendocino)

Jon Rogers, being first duly sworn, deposes and says that (he) or she is President of Coastal Mountain Electric the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Signature

Jon Rogers

Date Received 12/9/2020
Date Opened 12/9/2020
Initials IPM

BID FORM FOR MENDOCINO COUNTY

**SHERIFF ADMINISTRATION MAIN SERVICE
REPLACEMENT AND GENERATOR**

TO: Honorable Board of Supervisors

It is understood that this bid is based upon completion of the work within the time of completion requirements contained in the Instructions to Bidders.

It is agreed that this bid may not be withdrawn for a period of eighty (80) days from the opening hereof.

The undersigned has carefully checked all its figures and understands that the County will not be responsible for any error or omissions on the part of the undersigned in making up this bid.

If awarded the Contract, the undersigned agrees to complete the Work one hundred eighty (180) calendar days from the date of Notice to Proceed.

The undersigned, having become completely familiar with all conditions affecting the cost of the work at the place where the work is to be done, and with the drawings, specifications and other contract documents prepared and issued thereof and now on file at the General Services Agency Office, hereby proposes and agrees to perform everything required to be performed, and to provide and furnish any and all required labor, materials, equipment, transportation and services necessary to erect and complete in the best workmanlike manner, all as shown and specified.

The following bid amounts are as defined and clarified in the Bids Required portion of these specifications:

BASE BID:

two hundred sixty-nine thousand

four hundred thirty-seven & $\frac{40}{100}$ Dollars (\$ 269,437.⁰⁰)

All bids shall include required California State Sales Tax, cost of all bonds and insurance as required and all other items of expense incidental to the contract. The County of Mendocino is exempt from Federal Excise Tax.

A licensed Contractor shall not submit a bid to a public agency unless its Contractor's License number appears clearly on the bid, the license expiration date is stated, and the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information, or a bid containing information which is subsequently proven false, shall be considered nonresponsive and shall be rejected by the public agency.

Name of Bidder Coastal Mountain Electric

Name of Organization James Day Construction, Inc.

Type of Organization Corporation
(Corporation, Partnership, etc.)

Address 14832 Lakeshore Dr. Clearlake, CA 95422

Name of State where incorporated California

CONTRACTORS LICENSE NO. 507105 EXPIRATION DATE 3/31/21

☒ Contractor has registered with the State of California's DIR (Department of Industrial Relations) website.

DIR Registration #: 1000008522

☒ Contractor is currently licensed to do business in the County of Mendocino.

Mendocino County Business License #: 125517

ADDENDA: CONTRACTOR TO ACKNOWLEDGE RECEIPT

I have received the following Addenda pertaining to this project and they have been included as part of my bid.

Numbers: #1

The undersigned hereby certifies under penalty of perjury that this bid is genuine and not collusive, that all the information is correct and that he/she has carefully checked all of the above figures and understands that the County will not be responsible for any errors or omissions on the part of the undersigned on making up this bid.

Signature Jim Regan

Corporate Seal





TOKIOMARINE
HCC

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That American Contractors Indemnity Company of the State of California, a California corporation, does hereby appoint,

DAREN EISEMAN

its true and lawful Attorney-in-Fact, with full authority to execute on its behalf bond number BB2012291, issued in the course of its business and to bind the Company thereby, in an amount not to exceed One million and 00/100 (\$1,000,000.00).

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following resolutions adopted by the Board of Directors of AMERICAN CONTRACTORS INDEMNITY COMPANY at a meeting duly called and held on the 1st day of September, 2011.

"Be it Resolved, that the President, any Vice-President, any Assistant Vice-President, any Secretary or any Assistant Secretary shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

Attorney-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements or indemnity and other conditional or obligatory undertakings, including any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts, and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be binding upon the Company as if signed by the President and sealed and effected by the Corporate Secretary.

Be it Resolved, that the signature of any authorized officer and seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signature or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

The Attorney-in-Fact named above may be an agent or a broker of the Company. The granting of this Power of Attorney is specific to this bond and does not indicate whether the Attorney-in-Fact is or is not an appointed agent of the Company.

IN WITNESS WHEREOF, American Contractors Indemnity Company has caused its seal to be affixed hereto and executed by its President on this 1st day of June, 2018.

State of California
County of Los Angeles



AMERICAN CONTRACTORS INDEMNITY COMPANY

By: _____

Adam S. Pessin
Adam S. Pessin, President

A Notary Public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

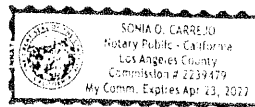
On this 1st day of June, 2018, before me, Sonia O. Carrejo, a notary public, personally appeared Adam S. Pessin, President of American Contractors Indemnity Company, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of CALIFORNIA that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

(seal)



I, Kio Lo, Assistant Secretary of American Contractors Indemnity Company, do hereby certify that the Power of Attorney and the resolution adopted by the Board of Directors of said Company as set forth above, are true and correct transcripts thereof and that neither the said Power of Attorney nor the resolution have been revoked and they are now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this 3rd day of December, 2020.

Bond No. BB2012291

Agency No. 5684



Kio Lo
Kio Lo, Assistant Secretary



TOKIO MARINE
HCC

Bond Number: BB2012291

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That we, JAMES DAY CONSTRUCTION, INC. DBA COASTAL MOUNTAIN ELECTRIC
(hereinafter
called Principal), as Principal, and AMERICAN CONTRACTORS INDEMNITY COMPANY
, a corporation organized and existing under the laws of CALIFORNIA,
(hereinafter called Surety) as Surety, are held and firmly bound unto _____
COUNTY OF MENDOCINO
(hereinafter called Oblige) as Oblige, in the penal sum of TEN
percent (10 %) of amount bid not to exceed
THIRTY FIVE THOUSAND AND 00/100 Dollars (\$ 35,000.00) for the
payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors
and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That, whereas the Principal has submitted or is about to
submit a proposal to the Oblige on a contract for BID 41-20: SHERIFF ADMINISTRATION MAIN PANEL REPLACEMENT AND GENERATOR PROJECT

NOW, THEREFORE, if the said contract be awarded to the Principal and the Principal shall, within such time as
may be specified, enter into the contract in writing, then this obligation shall be void. If the Principal shall fail to do
so, then the undersigned shall pay the obligee the damages which the obligee may suffer by reason of such failure
up to and not exceeding the penal sum of the bond.

Signed and sealed this 3RD day of DECEMBER, 2020.

Principal:

JAMES DAY CONSTRUCTION, INC. DBA COASTAL MOUNTAIN ELECTRIC

By: 

Surety:

AMERICAN CONTRACTORS INDEMNITY COMPANY

By: 

DAREN EISEMAN

Attorney-In-Fact



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA

COUNTY OF SACRAMENTO }

On 12-3-2020 before me, KATY TAYLOR Notary Public,
Date (here insert name)

personally appeared DAREN EISEMAN,

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/~~she~~/they executed the same in his/~~her~~/their authorized capacity(ies), and that by his/~~her~~/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature:  (Seal)



OPTIONAL INFORMATION

Description of Attached Document

Title or Type of Document: _____ Number of Pages: _____

Document Date: _____ Other: _____

Name of Contractor: James Day Construction, Inc.
dba Coastal Mountain Electric

PORTION OF WORK	SUBCONTRACTOR'S NAME	<u>CONTRACT LIC.</u> DIR REG #	LOCATION
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[illegible]

SECTION 00500

AGREEMENT FOR LUMP SUM BID

THIS AGREEMENT, made on the ____ day of _____ in the year 2020, between the County of Mendocino, hereinafter called COUNTY, and Coastal Mountain Electric, hereinafter called CONTRACTOR.

COUNTY and CONTRACTOR, for the consideration described below named, agree as follows:

FIRST: CONTRACTOR shall furnish all labor, materials, equipment, mechanical workmanship, transportation, and services for the installation and completion of the Mendocino County **Sheriff Administration Main Service Replacement and Generator Project**, in accordance with the contract documents, including the Addenda thereto, all as adopted by COUNTY.

SECOND: The work under this contract described below shall be completed within one hundred eighty (180) calendar days from the date of the "Notice to Proceed".

THIRD: The Contract consists of the following documents, all of which are fully a part hereof as if herein set out in full, whether or not hereto attached:

1. Invitation to Bid
2. Instructions to Bidders
3. Agreement
4. Contractor's Guarantee
5. Close-Out Items including all Warranties
6. Coordination
7. Construction Temporary Facilities
8. Drawings & Specifications
9. General and Technical Conditions of the Specifications
10. All modifications thereof incorporated before execution of the Contract

FOURTH: COUNTY shall pay to CONTRACTOR, if CONTRACTOR is successful bidder, as full consideration for the faithful performance of the Contract the sum of:

Two hundred sixty-nine thousand four hundred thirty-seven dollars \$269,437.00

This sum constitutes the bid for the following project components (referenced hereunder to specifications section). This sum includes the following alternate bids:

NO ALTERNATES

Payment shall be made each month to CONTRACTOR in accordance with and subject to the provisions embodied in the Documents made a part of this Contract.

IN WITNESS WHEREOF

DEPARTMENT FISCAL REVIEW:

Janelle Rasmussen 12/24/2020
DEPARTMENT HEAD DATE

Budgeted: ☒ Yes ☐ No

Budget Unit: 1710 CI 011

Line Item: 864360

Grant: ☐ Yes ☒ No

Grant No.: _____

CONTRACTOR/COMPANY NAME

By: Jan Rasmussen
Date: 12-11-20

NAME AND ADDRESS OF CONTRACTOR:

Coastal Mountain Electric

14832 Lakeshore Drive

Clearlake, CA 95422

COUNTY OF MENDOCINO

By: _____
JOHN HASCHAK, Chair
BOARD OF SUPERVISORS

Date: _____

ATTEST:

CARMEL J. ANGELO, Clerk of said Board

By: _____
Deputy

I hereby certify that according to the provisions of Government Code section 25103, delivery of this document has been made.

CARMEL J. ANGELO, Clerk of said Board

By: _____
Deputy

By signing above, signatory warrants and represents that he/she executed this Agreement in his/her authorized capacity and that by his/her signature on this Agreement, he/she or the entity upon behalf of which he/she acted, executed this Agreement

COUNTY COUNSEL REVIEW:

APPROVED AS TO FORM:

CHRISTIAN M. CURTIS,
County Counsel

By: Matthew Kiedrowski
Deputy

Date: 12/28/2020

INSURANCE REVIEW:

By: Carmel J. Angelo
Risk Management

Date: 12/24/2020

EXECUTIVE OFFICE/FISCAL REVIEW:

By: Janelle Rasmussen
Deputy CEO

Date: 12/24/2020

Signatory Authority: \$0-25,000 Department; \$25,001- 50,000 Purchasing Agent; \$50,001+ Board of Supervisors

Exception to Bid Process Required/Completed ☐

Mendocino County Business License: Valid ☐

Exempt Pursuant to MCC Section: _____

SECTION 00501

WORKERS' COMPENSATION CERTIFICATION

Pursuant to California Labor Code Section 1861, the Contractor hereby certifies the following:

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

Dated_____

Contractor Signature_____

SECTION 00510

CONTRACTOR GUARANTEE

**SHERIFF ADMINISTRATION MAIN SERVICE
REPLACEMENT AND GENERATOR**

Contractor hereby guarantees that the labor and material furnished for this project is in accordance with the drawings and specifications. Contractor agrees to repair or replace any or all of the work, together with any other adjacent work which may be displaced in so doing, that may prove to be defective in its workmanship or material within a period of ONE (1) YEAR from date of acceptance of the above named project by County without any expense whatsoever to County, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of Contractor's failure to comply with the above-mentioned conditions within fifteen (15) calendar days after being notified in writing by County, Contractor authorizes County to proceed to have said defects repaired and made good at Contractor's expense. Contractor shall honor and pay the costs and charges therefore upon demand.

SIGNED_____

COUNTERSIGNED_____

CONTRACTOR_____

DATED_____

DATE OF BUILDING ACCEPTANCE_____

CONSTRUCTION SITE STORM WATER POLICY

PART I – GENERAL

1.1 SUMMARY

- A. Mendocino County Ordinance No. 4313 STORM WATER RUNOFF POLLUTION PREVENTION PROCEDURE (Mendocino County Code Chapter 16.30 et.seq.) requires any person performing construction and grading work anywhere in the county shall implement appropriate Best Management Practices (BMP) to prevent the discharge of construction waste, debris, sediment or contaminants from construction materials, tools and equipment from entering the storm drainage system or natural waterways (off-site).
- B. By commencing work in this contract, the contractor agrees to comply with Mendocino County Code Section 16.30.140 Inspection and monitoring. The County may enter the worksite whenever necessary to perform inspections related to the Storm Water Runoff Pollution Prevention Procedures for the project including inspection of BMP's and records relating to storm water plan compliance.

1.2 SUBMITTALS

- A. Prior to beginning construction activities, submit construction site Best Management Practice (BMP) Plans and Specifications prepared by a Qualified Storm Water Developer (QSD) or the Contractor referencing Mendocino County Building and Planning Services Documents noted below:
 - 1. Construction Best Management Practices for over-the-counter building permits for projects that do not disturb any soil.
 - 2. Small Construction Site Storm Water Erosion and Sediment Control Plan Template for projects that will disturb any soil.
- B. Submittal shall include a project specific BMP plan for all areas of soil disturbance and possible contamination source generated by the project. Attach copies of the relevant current BMP fact sheets from the California Storm Water BMP Handbook Portal planned to address each potential source of contamination generated by the project.
- C. A County approved BMP plan is required prior to beginning work on the project.

Part 2 – PRODUCTS

2.1 MATERIALS

- A. Provide Materials in Compliance with Approve BMP fact sheets in appropriate quantities to mitigate possible runoff, sedimentation and/or contamination in accordance with the approved BMP plan.

Part 3 – EXECUTION

3.1 PREPARATION

- A. Prepare BMP schedule to identify dates when BMP's will be installed.
- B. Ensure that BMP Materials are on site in the event of an untimely rain event and prior to October 15th.
- C. Identify and mark Storm Drain Inlets and drainage features leading to storm drains or natural waterways.
- D. Identify and provide instruction and training to on site personnel responsible for installation and management of BMP's.

3.2 INSTALLATION

- A. Complete BMP installation Prior to October 1st or prior to ground disturbance activities between October 1st and April 15th, and call the project manager for an inspection of the installed BMP plan. Do not start grading activities without BMP's in place.
- B. Comply with installation guidelines included with BMP fact sheets and suitable to site conditions.
- C. Remove Contamination and Sediment BMP's after sources of sedimentation, or contamination have been removed from the site or final soil stabilization is complete. Do not remove Erosion Control BMP's until permanent Erosion Control features are established unless directed by the County.

3.3 INSPECTION

- A. It is the responsibility of the Contractor to provide regular inspection of BMP's throughout the rainy season. Maintain and replace all BMP's in accordance with the approved BMP plan.
- B. Prior to significant rain events, inspect installed BMP's to ensure all potential sources of contamination, sedimentation or erosion are protected by approved BMP's.
- C. During significant rain events verify that installed BMP's are adequate to the flows on the project site.
- D. Record inspection findings as required by approved BMP plan.
- E. Maintain Inspection records and a copy of the approved BMP plan on the project

site for inspection by County and NCWRCB.

- F. Failure of the Contractor to comply with the requirements of these specifications and the provisions of the approved Storm Water pollution Prevention Plan or BMP plan may result in work stoppage, a written citation, monetary fine or any combination thereof.

END OF SECTION

SECTION 007000

GENERAL CONDITIONS

1. DEFINITIONS

Whenever in the Specifications and other Contract Documents the following abbreviations and terms are used, the intent and meaning shall be interpreted as follows:

- A. "Owner" - Board of Supervisors, County of Mendocino, or its authorized agents or assignees.
- B. "Agent" - The Agent acting for the County, which shall be either the County General Services Agency Director or his/her designee, or the County Executive Officer or his/her designee.
- C. "Contractor" - The person or persons, partnership, corporation, or combination thereof, private or municipal, who have entered into a contract with the County, as party or parties of the second part or his/her or their legal representatives.
- D. "Specifications" - The directions, provisions and requirements contained in these Specifications as supplemented by the Supplementary Conditions. Whenever the term "These Specifications" is used in this book, it means the provisions as set forth in this book.
- E. "Paragraph" - The particular section of subdivision herein designated by a number.
- F. "Laboratory" - The designated laboratory authorized by the County to test materials and work involved in the Contract.
- G. In the case of conflict between the Standard Specification and these Specifications, these Specifications shall take precedence over and be used in lieu of such conflicting portions:
 - A.W.S. American Welding Society
 - A.S.T.M. American Society for Testing Materials
 - A.S.A. American Standard Association
 - N.B.F.U. National Board of Fire Underwriters
 - N.B.S. National Bureau of Standards
 - A.S.M.E. American Society of Mechanical Engineers
 - A.R.I. American Refrigeration Institute
 - N.E.M.A. National Electrical Manufacturers Association
 - U.L. Underwriter's Laboratories
 - E.T.L. Electrical Testing Laboratories
 - A.C.I. American Concrete Institute
 - F.A. Federal Specifications
 - A.I.S.C. American Institute of Steel Construction
- H. The County and the Contractor are those named as such in the Agreement. They are treated throughout the Contract Documents as if each were of the singular number and the masculine gender.

- I. When the words "Approved", "Satisfactory", or "Equal", "As Directed", etc. are used, approval by the County is understood.
- J. All Federal, State laws and local laws shall govern the construction of the Contract and all rules, ordinances and requirements of authorized officials shall be complied with.
- K. It is understood that any reference to the Specifications or designation of the American Society for Testing Materials, Federal Specifications or other standard, code, or order, refers to the most recent or latest amended specification or designation.

2. EXAMINATION OF PLANS AND SPECIFICATIONS

The Bidder shall examine carefully the site of the work contemplated and the proposal, plans, specifications, and Contract forms thereof. It will be assumed that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and material to be furnished, and as to the requirements of these Specifications.

3. DRAWINGS AND SPECIFICATIONS

- A. Figured dimensions on the drawings shall govern, but work not dimensioned shall be as directed. Work indicated but not particularly detailed or specified shall be equal to similar parts that are detailed or specified, or as directed. Full-size detailed shall take precedence over scale drawings as to shape and details of construction. It is intended that scale drawings, full-size details and specifications should agree, but should any discrepancy or apparent error occur in plans and specifications or should any work of others affect this work, the Contractor shall notify the County at once; if the Contractor proceeds with the work affected without instruction from the County he shall make good any resultant damage or defect.
- B. All misunderstandings of drawings or specifications shall be clarified by the County, whose decision shall be final.
- C. Any work called for by the drawings and not mentioned in the Specifications, or vice versa, is to be furnished as though fully set forth by both. Where not specifically stated otherwise, all work and materials necessary for each unit of construction, including special construction for any specific brand or shape of material called for even though only briefly mentioned or indicated, shall be furnished and installed fully and completely as a part of the Contract.
- D. Lists, rules and regulations referred to are recognized printed standard and shall be considered as one and a part of these Specifications within the limits specified.
- E. "General Conditions" apply with equal force to all of the work, including extra work authorized.
- F. For convenience, the Technical Specifications are arranged in Divisions and further divided into various sections. It is to be understood, this separation is for convenience of all parties involved and is not to be considered as the limits of the work required of any separate trade. The terms and conditions of such limitations are wholly between the County and the Contractors during bidding and construction

phases; i.e., all work shown, as well as for the proper completion of the project as a whole, shall be coordinated by the Contractor and his Subcontractors during bidding and construction and shall be provided in this Contract.

4. CONDUCT OF WORK

- A. The County reserves the right to do other work in connection with the project by contract or otherwise. Contractor shall at all times conduct his work so as to impose no hardship on the County or others engaged in the work. Contractor shall adjust, correct, and coordinate his work with the work of others so that no discrepancies shall result in the whole work.
- B. The Contractor shall provide at his own cost and risk all labor, material, water, power tools, machinery, scaffolding, and framework for the execution of the work. Equipment shall be adequate and as approved.

The Contractor shall obtain all necessary measurements from the work and shall check dimensions, levels, and construction and layout and supervise the construction, for correctness of all of which he shall be responsible.

- C. Where work of one trade joins or is on other work, there shall be no discrepancy when same is completed. In engaging work with other materials, marring or damaging same shall not be permitted. Should improper work of any trade be covered by another which results in damage or defects, the whole work affected shall be made good without expense to the County.
- D. The Contractor must anticipate relation of all parts of the work and at the proper time furnish and set anchorage, blocking or bonding as required. Anchorage and blocking necessary for each trade shall be a part of same, except where stated otherwise.
- E. Assistance required by the County in obtaining measurements or information on the work shall be furnished accurately and fully without cost to the County.

5. OWNERSHIP OF DRAWINGS

All plans and specifications shall remain the property of the County and shall be returned to the office of the County Facilities and Fleet Division Manager or shall be accounted for by the Contractor before the final certificate will be issued.

6. PUBLIC AND COUNTY CONVENIENCE AND SAFETY

The Contractor shall furnish, erect, and maintain such fences, barriers, lights and signs as are necessary to give adequate warning to the public at all times and of any dangerous conditions until final acceptance of the work by the County.

7. ACCIDENT PREVENTION

- A. It shall be the Contractor's responsibility to keep himself fully informed of all existing and future safety regulations, Codes, OSHA requirements, and other laws and regulations governing the work which may in any manner affect anyone in and around the project or engaged or employed in the work, or materials, equipment, etc. used in the work or which in any way affect the conduct of the work.

- B. The Contractor shall appoint a Safety Officer for the project and submit his name to the County.
- C. The Contractor shall supply the County with a Material Safety Data Sheet (MSDS) on each hazardous substance to be used by the Contractor on the project.
- D. The Contractor and his Safety Officer shall be solely responsible for insuring compliance with those Codes, regulations, OSHA requirements, and for discovering and correcting any code violations or unsafe conditions.
- E. Reports of all lost-time accidents shall be promptly submitted to the Owner, giving all pertinent information.

8. RESPONSIBILITY FOR DAMAGE

The County shall not be answerable or accountable in any manner for: (1) any loss or damage that may happen to the work or any part thereof, for any loss or damage to any of the materials or other things used or employed in performing the work; (2) injury to or death of any person or persons, either workers or the public; (3) damage to property from any cause which might have been prevented by the Contractor or his workers or anyone employed by him. The Contractor shall be responsible for any liability imposed by law for injuries to or death of any person including, but not limited to, workers and the public or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance. The Contractor shall indemnify, save harmless and defend the County of Mendocino, its elected or appointed officers, agents, employees or volunteers connected with the work, from all claims or actions for injuries or death of any person, or damage to property, resulting from the Contractor's performance of the Contract. With respect to third party claims against the Contractor, the Contractor waives any and all rights to any type of express or implied indemnity against the County of Mendocino, its elected or appointed officers, agents, employees or volunteers.

In addition to any remedy authorized by law, so much of the money due the Contractor under and by virtue of the Contract as shall be considered necessary by the County may be retained by the County until disposition has been made of such suits or claims for damages as aforesaid.

9. LAWS TO BE OBSERVED

The Contractor shall keep himself fully informed of all existing and future State, Federal and local laws, codes and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies and tribunals having any jurisdiction or authority over the same and shall be solely responsible for insuring compliance with those laws, codes and regulations.

A partial, though not necessarily complete listing of laws to be observed by the Contractor is as follows:

- A. Federal Americans with Disabilities Act of 1990.
- B. Federal Labor Standards Act.

- C. The Anti Kick-Back regulations found in 29 CFR Part 3.
- D. All contract clauses required by 29 CFR 5.5 (a) and (c), 20 U.S.C. 1232b ; 40 U.S.C. 276a, 276c, 327-332; 29 CFR Parts, (926).
- E. Nondiscrimination clause and Certification of Non-Segregated Facilities prescribed by Executive Order No. 11246, September 24, 1965 as amended by Executive Order 11375.
- F. Executive Order No. 11288 of July 7, 1966 (31 FR 9261) "Prevention, Control and Abatement of Water Pollution".
- G. Executive Order 11988, relating to evaluation of flood hazards.
- H. Compliance with all Federal, State and local requirements for handicapped access, fire safety and seismic resistance.

10. BONDS REQUIRED

The successful bidder shall furnish bonds as required in the document entitled "Instructions to Bidders" which is part of these Contract documents.

11. INSURANCE

The Contractor, at his expense, shall secure and maintain at all times during the entire period of performance under this Contract, insurance as set forth below with insurance companies acceptable to the County of Mendocino.

The Contractor shall provide to the County of Mendocino certificates of insurance with endorsements properly executed by an officer or authorized agent of the issuing insurance company evidencing coverage and provisions as stated below:

A. INSURED

Name the County of Mendocino, its elected or appointed officials, employees, agents and volunteers as additional insured with regard to damages and defense of claims arising from: (a) activities performed by or on behalf of the Named Insured, (b) products and completed operations of the Named Insured, (c) Premises owned, leased or used by the Named Insured, or (d) Ownership, operation, maintenance, use, loading or unloading of any vehicle owned, leased, hired or borrowed by the Named Insured, regardless of whether liability is attributable to the Named Insured or a combination of the Named Insured and the County of Mendocino, its elected or appointed officials, employees, agents and volunteers.

B. SEVERABILITY OF INTEREST

Provide that the inclusion of more than one named insured shall not operate to impair the rights of one insured against another insured, and the coverages afforded shall apply as though separate policies had been issued to each insured.

C. CONTRIBUTION NOT REQUIRED

Provide that as respects: (a) work performed by the Named Insured on behalf of the County of Mendocino; or (b) products sold by the Named Insured to the County of Mendocino; or (c) premises leased by the Named Insured from the County of Mendocino; or (d) ownership, operation, maintenance, use, loading or unloading of any vehicle owned, leased, hired or borrowed by the Named Insured, the insurance afforded by this policy shall be primary insurance as respects the County of Mendocino, its elected or appointed officials, employees, agents and volunteers; or stand in an unbroken chain of coverage excess of the Named Insured's scheduled underlying primary coverage. In either event, any other insurance maintained by the County of Mendocino, its elected or appointed officials, employees, agents and volunteers shall be excess of this insurance and shall not contribute with it.

D. COVERAGE BELOW MINIMUM REQUIRED NOTICE

Provide that the limits of insurance afforded by this policy shall not fall below the minimum requirements of the County of Mendocino without notice to the County of Mendocino by certified mail return receipt requested. Such notice shall be addressed to: County of Mendocino, 501 Low Gap Road, Ukiah, Calif. 95482, Attn: Risk Management.

E. CANCELLATION NOTICE

Provide that the insurance afforded by this policy shall not be suspended, voided, canceled, non-renewed or reduced in coverage or in limits except after thirty (30) day's prior written notice, delivered in person or by First Class U.S. Mail, has been given to the County of Mendocino. Such notice shall be addressed to: County of Mendocino, 841 Low Gap Road, Ukiah, Calif. 95482, Attn: Risk Management.

Contractor shall furnish to the County of Mendocino certificate(s) of insurance evidencing Workers Compensation Insurance coverage to cover its employees. The Contractor shall require all subcontractors similarly to provide Workers Compensation Insurance as required by the Labor Code of the State of California for all of the Contractor's and subcontractors' employees.

The Contractor shall not commence work, nor shall he allow his employees or subcontractors or anyone to commence work until all insurance required and provisions contained herein have been submitted to and accepted by the County of Mendocino. Failure to submit proof of insurance as required herein may result in awarding said Contract to another bidder. Failure to comply with the insurance requirements set forth herein shall constitute a material breach of contract and, at County of Mendocino's option, shall subject this Contract to termination.

Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the County of Mendocino from taking such other action as is available to it under any other provisions of this Contract or otherwise in law.

SCOPE OF LIABILITY COVERAGES

Contractor shall furnish to the County of Mendocino certificates of insurance evidencing at the minimum the following:

1. Public Liability-Bodily Injury (not auto) \$500,000 each person; \$1,000,000 each accident,
and
Public Liability-Property Damage (not auto) \$500,000 each occurrence;
\$1,000,000 aggregate.

---or---

Combined Single Limit Bodily Injury Liability and Property Damage Liability (not auto) \$1,000,000 each occurrence.

2. Vehicle-Bodily Injury \$500,000 each person, \$1,000,000 each occurrence,
and
Vehicle-Property Damage \$1,000,000 each occurrence.

---or---

Combined Single Limit Vehicle Bodily Injury and Property Damage Liability \$1,000,000 each occurrence.

12. WORKERS COMPENSATION CERTIFICATION

Contractor certifies as follows:

"I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workers Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this Contract". (Labor Code Section 1861)

13. CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the formal acceptance of the work by the County, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof or to materials or thing employed in doing the work or stored on the site by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, replace, and make good all injuries or damages to any portion of the work occasioned by any of the above caused before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy. The Contractor's responsibility also extends to adjoining property as related to the construction operation.

14. RESPONSIBILITY OF COUNTY

The County shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these Specifications.

15. COOPERATION BETWEEN CONTRACTORS

Where two or more contractors are employed on related or adjacent work, each shall conduct his operations in such a manner as not to cause any unnecessary delay or hindrance to the other. Each contractor shall be responsible to the other for all damage to work, to person or property, or for loss caused by failure to furnish the work within the time specified for completion.

Should the Contractor, through acts of neglect on the part of any Contractor, suffer loss or damage to the Work, the Contractor agrees to settle with such other Contractor by agreement. If such other Contractor should file claim against the County on account of alleged damages to be sustained, the County shall notify the Contractor who shall, at his expense, indemnify and save harmless the County against any such claim.

16. SUBCONTRACTING AND ASSIGNMENT

The Contractor shall give his personal attention to the fulfillment of the Contract and shall keep the work under his control. Should the Contractor subcontract any part of his Contract, the Contractor shall be fully responsible to the County for the acts and omissions of his subcontractor and of the persons either directly or indirectly employed by the subcontractor as he is for the acts and omissions of persons directly employed by himself.

No subcontractor will be recognized as such, and all persons engaged in the work on construction shall be considered as employees of the Contractor.

17. PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and file all notices necessary and incidental to the due and lawful prosecution of the work.

18. PATENTS

The Contractor shall assume all responsibilities arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work.

19. LIENS

Liens shall be enforced as provided by California State Law pertaining to Public Works.

20. CHANGES IN THE WORK

- A. The County may order changes in the work, in which event the Contract sum shall be adjusted by one or more, or a combination of, the following methods:
1. Unit bid prices previously approved or as may be agreed upon.
 2. An agreed lump sum substantiated by Contractor, itemizing labor, material, equipment, overhead, profit, bond, etc.
 3. By ordering Contractor to proceed with work and keep correct account with vouchers the actual cost of:
 - a. Labor, including foreman;
 - b. Materials entering permanently into the work;
 - c. The ownership or rental cost of construction plant and equipment during the time of use on the extra work;
 - d. Power and consumable supplies for the operation of power equipment;
 - e. Insurance;
 - f. Social Security and old age and employment contribution.

- B. To the cost under (2) and (3), there may be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) for the estimated cost of the work. The fee shall be compensation to cover the cost of administrative overhead, and profit.
- C. On changes which involve a credit to the County, no allowances for overhead need be figured.
- D. All such change orders and adjustments shall be in writing. Claims by Contractor for extra cost shall be made in writing before executing the work involved.
- E. All change orders shall be reviewed and approved by the County.

21. COUNTY'S RIGHT TO TERMINATE CONTRACT

If the Contractor should refuse or neglect to properly perform or prosecute the work or if he should substantially violate any provision of the Contract, then the County may, without prejudice to any other right or remedy upon seven (7) days written notice to the Contractor, terminate the services of the Contractor and take possession of the premises, and all materials, tools, and equipment thereon and complete the work. The expense thereof shall be deducted from the balance otherwise due the Contractor. If such expense should exceed such unpaid balance, then the Contractor shall pay the difference to the County.

22. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work is stopped for a period of thirty (30) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the work under a contract with the Contractor, or if the work should be stopped for a period of thirty (30) days by the Contractor because no certificate for payment has issued as provided in Paragraph 25 or because the County has not made payment thereon as provided in Paragraph 25, then the Contractor may, upon seven (7) additional days' written notice to the County, terminate the Contract and recover from the County payment for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

23. TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. In case all the work called for under the Contract is not completed before or upon the expiration of the time limit as set forth in these specifications, damage will be sustained by the County, and it is impracticable to determine the actual damage which the County will sustain in the event of and by reason of such delay. It is therefore agreed that the Contractor will pay to the County the sum of money per calendar day for each day's delay beyond the time prescribed as required in the document entitled "Instructions to Bidders", which is a part of these Contract Documents. The Contractor agrees to pay such liquidated damages as herein provided, and in case the same are not paid, agrees that the County may deduct the amount thereof from any money due or that may become due the Contractor under the Contract.
- B. In case the work called for under the Contract is not finished and completed in all parts and requirements within the time specified, the County shall have the right to extend the time for completion or not, as may best serve the interest of the County. If

the County decides to extend the time limit for the completion of the Contract, the County shall further have the right to charge the Contractor, his heirs, assigns or sureties, and to deduct from the final payment for the work, all or any part, as it may deem proper, of the actual cost of County, including inspections, superintendence, and other overhead expenses directly chargeable to the Contract, and which accrue during the period of such extension. The cost of final inspections shall not be included in such charges.

- C. The Contractor shall not be assessed with liquidated damages nor the cost of County's services and inspection during any delay in the completion of the work caused by acts of God or the public enemy, acts of the County, fire, flood, earthquake, epidemics, quarantine restrictions, strikes, freight embargoes, shortages of materials, labor, fixtures or equipment (provided the Contractor furnishes satisfactory and acceptable proof that he has made diligent attempts to obtain same) and unusually severe weather or delays of subcontractors due to such causes, provided the Contractor shall within ten (10) days from the beginning of such delay notify the County in writing of the delay. County's findings of fact thereon shall be final and conclusive.
- D. The County agrees that changes in work ordered pursuant to Paragraph 20 and extensions of completion time made necessary by reasons thereof, shall in no way release any guarantee given by the Contractor or the Contract let hereunder, nor shall such changes in the work relieve or release the sureties on bonds executed pursuant to these specifications. Sureties shall be deemed to have expressly agreed to any change in the work and to any extension of time made by reason thereof.

24. ACCEPTANCE

- A. The Contract will be accepted as completed only when the whole and entire Contract shall have been completed satisfactorily to the County. In judging the work, no allowance for deviations from the original plans and specifications will be made unless already approved in writing at proper times and in a manner as called for herein.
- B. Should it become necessary to occupy a portion of the work before the Contract is fully completed, such occupancy shall not constitute acceptance.

25. PARTIAL PAYMENTS

Prior to submitting and as a condition of approval of the first progress payment application, the Contractor shall submit a schedule of values acceptable to the County providing a breakdown of the contract value by trade division such that the County can accurately assess the percentage completion of the project.

On the twenty-fifth (25th) day of each month, the Contractor shall submit to the County an application for payment, on a form acceptable to the County, showing an itemized statement for work that has been performed on a percent complete basis based on the previously approved schedule of values. The County within thirty (30) days of receipt of application that meets the County's approval shall issue to the Contractor a certificate for ninety percent (95%) of the amount the County finds due for work that has been performed.

Contractor shall submit certified copy of payroll showing payment of Davis-Bacon Act wages with each request for payment submitted.

26. FINAL PAYMENT

Upon completion of the Contract, the County will cause to be made a final estimate of the amount of work done, and the value of such work. After approval by the County representative, the County shall pay the remainder due on the contract (with the exception of retainage) after deducting there from, all previous payments. All amounts retained (retainage) under the provisions of the Contract shall be due and payable 30 days from the date of acceptance in writing of the completion of Contract and / or Notice of Completion issued by the County representative. All prior partial estimates and payments shall be subject to correction in the final estimate and payments. Payment and the final estimate is due within thirty-five (35) days from the recorded date of the Notice of Completion, provided all as-built drawings, equipment manuals, instructions to the owner and guarantees have been received and accepted by the County.

27. PAYMENT WITHHELD

The County may withhold or, on account of subsequently discovered evidence, may nullify the whole or part of any certificates to such extent as may be necessary to protect the County from (1) defective work not remedied, (2) asserted claims against Contractor, (3) failure of the Contractor to make payments properly to employees or for material or labor, (4) any reasonable doubt that the Contract work can be completed for the balance then unpaid, or (5) damage to another contractor.

28. FAULTY WORK AND MATERIALS

The Contractor shall promptly remove from the premises all materials condemned by the County as failing to conform to the Contract, whether incorporated in the work or not. The Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the County. The Contractor shall bear the expense of making good all work of other contractors destroyed or damaged by such removal.

If the Contractor does not remove such condemned work and materials within reasonable time, fixed by written notice, the County may remove them and may store the materials at the expense of the Contractor. If the Contractor does not pay the expenses of such removal within ten (10) days thereafter, the County may upon ten (10) days written notice, sell such materials at auction or at private sales and shall account for the net proceeds thereof after deducting all costs and expenses that should have been borne by the Contractor.

29. TEMPORARY SUSPENSION OF WORK

The County shall have the authority to suspend the work wholly or in part, for such period as it may deem necessary, due to unsuitable weather or to such other conditions as are considered unfavorable for the suitable progression of the work, or for such time as it may deem necessary due to the failure of the Contractor to carry out orders given by County, or to perform any provision of the Contract. The Contractor shall immediately obey such order of the County and shall not resume work until ordered in writing by the County.

30. SAMPLES

When requested, the Contractor shall submit for the County's review samples of the various materials, together with the finish thereof, as specified for and intended for use in the work. Samples of bulk materials shall be selected by the lab. All materials and

workmanship shall in all respects be equal to the samples so submitted and reviewed. Samples shall be sent or delivered to the County, samples and delivery charges paid by Contractor. Samples will be returned to the Contractor if requested, shipping or delivery charges collect.

31. CLEANING AND REMOVAL OF DEBRIS

The Contractor shall, as directed by the County during the progress of the work or as indicated elsewhere in these documents, remove and properly dispose of dirt and debris and shall keep the premises reasonably clean. Upon completion of the work, the Contractor shall remove all of his equipment and unused materials provided for the work, and shall put the building and appurtenances in a neat and clean condition and shall do all cleaning and washing required by the specifications.

32. OBSTRUCTIONS

The Contractor may be required to work around public utility facilities and other improvements which are to remain in place within the construction area. The Contractor shall be held liable to the owners of such facilities and improvements for any damage or interference with service resulting from the Contractor's operation.

The exact location of underground facilities and improvements within the construction area, whether shown on the drawings or not, shall be ascertained by the Contractor before using equipment that may damage such facilities or interfere with their service.

33. SUPERINTENDENT IN CHARGE

The Contractor shall keep on the work at all times and until the acceptance certificate is issued a competent superintendent or foreman for the purpose of receiving and executing without delay any orders from County in keeping with the terms of the Contract. This foreman shall have charge of the plans and specifications kept on the job. He shall be instructed to familiarize himself closely with all provisions of the plans and specifications and to follow the same accurately.

34. STORAGE OF MATERIALS AND EQUIPMENT

Materials and equipment shall not be stockpiled or placed outside of the site property lines unless written permission is obtained by the appropriate owner or political subdivision having jurisdiction over the adjacent property, roads, streets, etc.

35. GENERAL GUARANTY

Neither the final payment nor any partial payment, nor partial or entire use of the premises by occupancy by the County shall constitute an acceptance of the work not completed in accordance with the Contract. Final Payment or partial payment or partial or entire use of the premises by occupancy shall not relieve the Contractor of liability with respect to any warranties or responsibilities for faulty materials or workmanship. The Contractor shall remedy any defect in the work and pay for any damage to other work resulting therefrom which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified elsewhere in these specifications. The County shall notify the Contractor of observed defects with reasonable promptness.

36. MATERIALS SUBMITTALS AND SUBSTITUTIONS

Materials and substitutions shall be governed by the relevant sections elsewhere in these documents. If not specified, the following shall govern.

- A. Specific reference to materials, appliances, fixtures and equipment by trade name is intended to be used as standard, but this implies no right on the part of the Contractor to use other materials, fixtures, appliances, equipment, until review by the County.
- B. The County alone shall determine what will be considered as equal, but the burden of proof as to quality, utility and function, etc. shall be upon the Contractor.

If the Contractor desires to substitute any item, he shall in writing state the cost of such item and the original item named in the specifications if requested and shall submit a substitution warranty in the format shown in the specifications.

- C. As soon as practicable and within twenty (20) days after official award of Contract and before any fixtures, materials or equipment are purchased, the Contractor shall submit to the County a complete list of materials, fixtures and equipment giving the manufacturers' names, catalog numbers, etc., and, when requested, the original and substitute item of each article which he proposes to install as a substitution.
- D. Requests for substitution will not be considered after the above period of time unless the item specified is not obtainable or, in the opinion of the County, such substitution would serve the County's interest.

37. CONSTRUCTION, MATERIAL AND LABOR COST SCHEDULES

- A. The successful Contractor shall submit the following schedules to the County within ten (10) days after commencing the work:
 - 1. A construction schedule indicating the start and finish of each phase of the work.
 - 2. A detailed statement of the cost of material and labor included in the original estimate for each phase of the work so arranged that the value of the work as it progresses may be readily determined.

38. CONFERENCES

At any time during the progress of the work, the County may request the Contractor to attend a conference of any or all of the Contractors engaged on the work, and any notice of such conference shall be duly observed and complied with by the Contractor.

39. INSPECTION AND PAYMENTS - NOT ACCEPTABLE

The fact that the work and materials have been inspected by the County of Mendocino and payments on account have been made does not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one (1) year from the date of the completion of the work by the Contractor and its acceptance by the County. [Five (5) years for roof.]

40. RETURN OF DRAWINGS AND SPECIFICATIONS

All plans and specifications shall be returned to the Office of the County Director of General Services or shall be accounted for by the Contractor before the final certificate will be issued.

41. ARRANGEMENT OF SPECIFICATION SECTION

- A. For convenience, these specifications are arranged in several sections, but such separation shall not be considered as limiting any work required to a particular trade. The Contractor shall in cooperation with other contractors establish responsibility for any work required by the plans and specifications which may be improperly arranged or not included in the appropriate section.
- B. In areas where one trade meets another for joining, the Contractor is responsible to be certain that all work shown is included in his bid.

42. QUALITY OF MATERIALS AND LABOR

All materials used on this Contract shall be new and the best market quality, unless specified or shown otherwise. All labor used on this Contract shall be competent and skilled for the work. All work executed under this Contract shall be done in the best, most thorough, substantial and workmanlike manner.

All material and labor not meeting these standards shall be removed. The County may refuse to issue any certificate of payment until all defective materials or work have been removed, and other material of proper quality substituted therefor.

43. INCOMPETENT WORKERS

If at any time any foreman or worker who shall be employed by the Contractor shall be declared by the County to be incompetent or unfaithful in executing the work, the Contractor, on receiving written notice, shall forthwith initiate appropriate action to dismiss such person from the work.

44. COUNTY TO DECIDE

All matters of color, texture, design, interpretation of plans and specifications shall be referred by the Contractor to County, whose decision thereon shall be final.

45. CODES

All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal; the Safety Orders of the Division of Industrial Safety; the California Electric Code; the California Building Code; California Mechanical Code; the California Fire and Plumbing Codes; OSHA and other applicable State and local codes and laws. Nothing in these plans or specifications is to be construed to permit work not conforming to these Codes.

46. PAYMENT OF FEDERAL, STATE OR LOCAL TAXES

Any Federal, State or Local tax payable on articles furnished by the Contractor under the Contract shall be included in the Contract price and paid by the Contractor.

47. LIMITATIONS OF HOURS OF WORK

Eight (8) hours labor constitutes a legal day's work. The Contractor shall forfeit as a penalty \$25.00 for each worker employed in the execution of the Contract by the Contractor for each calendar day which such worker is required or permitted to work more than eight (8) hours in one (1) calendar day and forty (40) hours in any one (1) calendar week in violation of the provisions of the California Labor Code, and in particular Sections 1810 and 1816. Work performed by employees of Contractors in excess of eight (8) hours per day and forty (40) hours during any one (1) week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1 & 1/2) times the basic rate of pay, as provided in Section 1815.]

48. PAYMENT OF NOT LESS THAN THE GENERAL PREVAILING RATE OF PER DIEM WAGES

- A. The Contractor shall pay his workers on all work included in this Contract not less than the general prevailing rate of per diem wages for legal holiday and overtime work in said locality. Such per diem wages shall not be less than the stipulated rates contained in a schedule thereof which has been ascertained and determined by the State Director of Industrial Relations to be the general prevailing rate of per diem wages for each craft or type of worker needed to execute this Contract.
- B. The Contractor shall comply with Labor Code Section 1775. In accordance with Section 1775, the Contractor shall forfeit as a penalty twenty-five dollars (\$25.00) for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rates for such work or craft in which such worker is employed for any work done under the Contract in violation of the provisions of the Labor Code in particular Labor Code Sections 1770 and 1780. In addition to said penalty, and pursuant to Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate shall be paid to each worker by the Contractor.

49. LABOR CODE CLARIFICATION

It is to be understood that references to the California Labor Code shall mean the current Code or as may be amended during the period of the Contract.

50. NOTIFICATION OF READINESS FOR REQUIRED TESTS AND INSPECTIONS

The Contractor shall be responsible to notify all inspectors, testing agencies, and County representatives a minimum of seventy-two (72) hours before required tests and/or inspections.

51. RESPONSIBILITY FOR PROJECT SAFETY AND CONSTRUCTION TECHNIQUES

Specifically omitted from the services of the County are all design and construction review services relating to the Contractor's safety precautions or to means, methods, techniques, sequences, or procedures required for the Contractor to perform his work.

Omitted services include, but are not limited to, shoring, scaffolding, underpinning, temporary retainment of excavations and any erection methods and bracing.

52. RECORD DRAWINGS

- A. The Contractor shall furnish one complete set of clean "Record" drawings to the County prior to project acceptance, showing clearly any changes made during construction. Record drawings shall be in accordance with Section 017839 Project Record Documents..
- B. In addition to any changes, all mechanical, electrical and plumbing items concealed in the building and underground, actually installed and routed. Depth below surface to top of underground item shall be indicated.
- C. All underground items shall be dimensioned from permanent reference points in a manner that they can be easily found in the field at a later time.
- D. Each sheet of the "Record" drawings shall be identified with the following label to be signed by the Contractor:

These are record drawings which have been
prepared or supervised by the undersigned.

Contractor	Date
------------	------

- E. The Contractor is solely responsible for the preparation, completeness, and accuracy of the "Record" drawings. The County and its representatives are not responsible to review the "Record" drawings.

53. OCCUPANCY OR USE BEFORE ACCEPTANCE OF COMPLETION

The County may occupy any building or portion thereof or use any improvement contemplated by the Contract prior to the completion of the entire work. A list of work to be completed and corrected by the Contractor, if any, shall be prepared and agreed to between the County and the Contractor before occupancy or use. Such occupancy or use shall not operate as an acceptance of any part of the work but shall start the guaranty-warranty period on the structure or portion thereof so occupied or improvement of equipment so used, provided, however, that such occupancy shall not start the guaranty-warranty period as to items appearing on the list of work to be completed and corrected. No such occupancy or use shall be deemed to have occurred unless and until the County has given the Contractor formal written notice of intention to so occupy or use, specifying the portion or portions of the structure, improvement or equipment which will be deemed so occupied or used.

54. COMPLIANCE WITH HANDICAPPED ACCESS LAWS

- A. It is the County's intent for all features on these plans and specifications to conform to applicable regulations for the accommodations of physically handicapped persons in buildings and facilities used by the public, whether or not said plans and specifications so conform.
- B. It shall be the responsibility of the manufacturers, suppliers and distributors to insure that all manufactured and fabricated products, devices and items they

supply for this project conform to applicable regulations of Title 24 of the California Code of Regulations.

C. When shop drawings and/or manufacturers product literature, and other matters subject to handicapped regulations are submitted to County, the following shall be provided:

1. Statement that the item shown complies with the handicapped regulations of Title 24 of the California Code of Regulations.
2. Show all required dimensions, heights, clearances, and locations that must be followed when items are installed on project.

55. CONTRACT AMBIGUITY

This Contract shall be deemed to have been prepared jointly by the parties signing the Contract and if any inconsistencies or ambiguities exist, they shall not be interpreted or construed against any of the parties as the drafter.

56. FAIR EMPLOYMENT PRACTICES/NONDISCRIMINATION

The Contractor shall comply with Federal and State Fair Employment Practices provisions.

The Contractor, in connection with performance of work under this agreement, agrees to comply with the rules and regulations which deal with or relate to nondiscrimination set forth as follows:

- A. During the performance of this Contract, the Contractor and its subcontractors shall not deny the Contract's benefits to any person on the basis of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sex or age, nor shall they discriminate unlawfully against any employee or applicant for employment because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, age, or sex. Contractor shall insure that the evaluation and treatment of employees and applicants for employment are free of such discrimination.
- B. The Contractor shall comply with the provisions of the California Fair Employment and Housing Act (Gov. Code, sections 12900 *et seq.*), the regulations promulgated thereunder (2 Cal. Code of Regulations sections 7285.0 *et seq.*), and Government Code Sections 11135 - 11139.5).
- C. The Contractor shall permit access by representatives of the Department of Fair Employment and Housing and the County upon reasonable notice at any time during the normal business hours, but in no case less than 24 hours notice, to view such of its books, records, accounts, other sources of information and its facilities as said Department or County shall require to ascertain compliance with this clause.
- D. The Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

- E. The Contractor shall include the above nondiscrimination and compliance provisions in above subparagraphs A and B in all subcontracts to perform work under the Contract.

END OF SECTION

UNFORESEEN PHYSICAL CONDITIONS

PART I – GENERAL

1.1 SUMMARY

This Section includes special requirements for unforeseen hidden conditions, differing site conditions and underground facilities as required for California Public Works Contracts.

1.2 UNFORESEEN SITE CONDITIONS

A. Pursuant to Section 7104 of the California Public Contract Code, if any of the following conditions, hereinafter called hidden conditions, are encountered at the site, then Contractor shall promptly, before such conditions are disturbed and in no event later than three (3) days after discovery, notify County in writing using the "Hidden Conditions Report" attached to this Document:

1. Material that Contractor believes may be hazardous waste material, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or a Class III disposal site in accordance with provisions of existing law.
2. Subsurface or latent physical conditions at the site or in the building differing materially from those represented in the Contract Documents.
3. Archaeological or historical artifacts or soils conditions identified with such artifacts as noted in the conditions of approval from the California Department of Parks and Recreation CEQA Document No. 11293 – Archaeological Review.
4. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents or conditions that could be observed by examination of the site and the Reference Documents.

B. Conditions that are not unforeseen, hidden, unknown or differing site and building conditions include but are not limited to, the following.

1. All that is indicated in or reasonably interpreted from the Contract Documents.
2. All that is indicated in or reasonably interpreted from the Reference Documents specified in Section 01010, "Summary of Work".
3. All that could be seen on site and that could be observed.
4. Conditions that are materially similar or characteristically the same.
5. Conditions where the location of the building component is in the proximity where indicated in or reasonably interpreted from the

Contract Documents or Reference Documents.

- C. County will promptly investigate the conditions reported which appear to be unforeseen conditions.
1. If County determines that the reported conditions are inherent in work of the character provided for in the Contract Documents or observed by examination of the site and Reference Documents, or that the condition is not hidden, unforeseen or materially different, Contractor shall execute the Work at no additional cost to County.
 2. If County determines that the conditions are hidden or differing conditions and that they will materially cause a decrease or increase in Contractor's cost of any portion of the work, a Contract Modification will be issued for compensation of such portion of the work as provided in the General Conditions.
 3. If County determines that the conditions are hidden or differing conditions and that they will materially affect the performance time, Contractor, upon submitting a written request, will be granted an extension of time subject to the provisions of the General Conditions.
 - a. Time extensions or contract costs will not be granted for delays that could be or could have been avoided by Contractor redirecting his forces and equipment to perform other work on the Contract.
- D. Should Contractor disagree with County's determination, Contractor shall submit a Request for Change (RFC) to County that the condition is not indicated in or reasonably interpreted from the Contract Documents, and that the condition is not similar in character to the material that could have been observed by examination of the site and Reference Drawings, but that the condition is materially different and the condition is unforeseen and unknown.
1. Contractor shall submit proof with written explanation, drawings, photographs, material and labor cost breakdowns, and other relevant data to show the condition.
 2. County will review Contractor's submission and make a determination. Contractor shall not file for claim or RFC before County makes the determination.
 3. In the event of continued disagreement, Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract.
 4. Contractor shall retain any and all rights provided either by the Contract or by law which pertain to the resolution of RFC and protests between the contracting parties.

1.3 REMOVAL, RELOCATION, OR PROTECTION OF EXISTING UTILITIES

- A. In accordance with the provisions of Section 4215 of the California Government Code, County will assume the responsibility for the removal, relocation, or protection of existing main or trunk-line utilities located on the site of the Contract work, if such utilities are not identified in the Contract Documents.
- B. Contractor shall immediately notify County and the public utility in writing of such utility facilities it discovers while performing the work which are not identified in the Contract Documents.
 - 1. Contractor shall negotiate with the owner of the utility, who shall have the sole discretion to perform repairs or relocation work or permit Contractor to do such repairs or relocation work at a reasonable price.
- C. Contractor shall not be assessed liquidated damages for delay in Substantial Completion if the delay was caused by such existing utilities in direct conflict with the work and not shown on the Drawings.
- D. Contractor will be compensated under the provisions of General Conditions Section 00700, Article 20 for extra work involving existing utilities not shown on the Drawings or included in the Specifications but in direct physical conflict with Contractor's operations.
 - 1. This extra work shall include the following costs:
 - a. Locating, supporting, working around, and protecting or repairing damage not due to the failure of Contractor to exercise reasonable care.
 - b. Removing and relocating, as directed by County, existing main or trunk line utility facilities located on site but not indicated on the Drawings and Specifications with reasonable accuracy.
 - c. Equipment on the project necessarily idled during such work.
- E. Contractor shall not be entitled to any adjustment in the Contract Sum or Time if the existence of such condition:
 - 1. Could have been reasonably discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Contract Documents to be conducted by or for Contractor prior to commencing such work, or
 - 2. Could have been inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the work site.

1.4 WORK STOPPAGES FOR HISTORICAL OR ARCHAEOLOGICAL FINDS

- A. CONTRACTOR shall not be entitled to any adjustment in the Contract Sum for reasonable accommodations required to comply with the conditions of approval.

- B. Work stoppages required and any special excavation requested by the Archaeological monitor will be compensated under the provisions of article 7 of the General Conditions.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

END OF SECTION

HIDDEN CONDITIONS REPORT (HCR)

Regional Behavioral Health Training Center - Flooring Project

HCR No. _____

Submitted By: _____ Date: _____

Ctr to PM

PM to Arch

Arch to PM

PM to

Ctr

Date Sent: _____

Date Received: _____

Type of Conditions Reported:

☐ Site Work

☐ Structural

☐ Architectural

☐ HVAC

☐ Plumbing

☐ Fire Protection

☐ Electrical

☐ Other

Location and Reference to Drawing: _____

Conditions Reported: _____

Investigated By: _____ Firm: _____ Date: _____

☐ Check this box if the hidden condition reported is not hidden. Reply with location(s) where the information can be obtained.

Reply of Findings: _____

By: _____ Firm: _____ Date: _____

The reply is a finding from the investigation. No change in the Contract Sum or Time is authorized. See Specifications Document 00811 for the timeliness of investigation.

00851

DRAWINGS INDEX

T-001 TITLE SHEET

ELECTRICAL

E-001 ELECTRICAL LEGEND & ABBREVIATIONS
E-101 ELECTRICAL SITE PLAN
E-102 ELECTRICAL PLAN - KITCHEN BUILDING
E-501 ELECTRICAL DETAILS
E-502 ELECTRICAL DETAILS
E-503 ELECTRICAL DETAILS
E-601 ELECTRICAL DIAGRAMS – DEMOLITION
E-602 ELECTRICAL DIAGRAMS – NEW WORK

STRUCTURAL

S-001 STRUCTURAL SHEET SPECIFICATIONS
S-501 STRUCTURAL DETAILS
S-502 STRUCTURAL DETAILS
S-503 STRUCTURAL DETAILS
S-504 STRUCTURAL DETAILS

END OF SECTION 00851

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

- 1.1 REQUIREMENTS of the drawings and general provisions of the Prime Construction Agreement and other sections of Division 1 apply to this section.
- 1.2 THIS SECTION sets forth general project scope, and general provisions regarding work to be performed by the Contractor.
- 1.3 THE WORK OF THIS CONTRACT consists of: Replacing the existing main service panel and standby generator with new a new panel system and Owner furnished standby generator and related work. The Project is located at 951 Low Gap Road, Ukiah, CA 95482.

WORK INCLUDED: Provide all documentation, labor, material, superintendence and administration as depicted in the drawings, as described in the project manual or as necessary for a complete and proper installation. Present to the Owner, at the close of construction, signed copies of all required permits indicating successful completion of all permit requirements.

- 1.4 APPLICABLE CODES AND REGULATIONS:
 - A. General Requirements: All materials and workmanship shall comply with the most recent edition of the California Code of Regulations (CCR), Title 24 (California Building Standards Code) with current State and local amendments. CCR, Title 24 consists of the following twelve parts:
 - Part 1 - California Building Standards Administrative Code
 - Part 2 - California Building Code
 - Part 3 - California Electrical Code
 - Part 4 - California Mechanical Code
 - Part 5 - California Plumbing Code
 - Part 6 - California Energy Code
 - Part 7 - (No longer published in Title 24. See Title 8, CCR)
 - Part 8 - California Historical Building Code
 - Part 9 - California Fire Code
 - Part 10 - California Existing Building Code
 - Part 11 - California Green Building Standards Code (CALGreen)
 - Part 12 - California Reference Standards Code
 - B. Energy Requirements: All materials and workmanship shall comply with the most recent editions of the California Code of Regulations, Title 24 (California Building Standards Code) with current State and

local amendments and the most recent edition of the Building Energy Efficiency Standards published by the California Energy Commission.

- C. Air Quality Requirements: All materials and workmanship shall comply with all current requirements of the Mendocino County Air Quality Management District. Provide all application materials, fees and documentation necessary to provide required notification and obtain all permits required by the Mendocino County Air Quality Management District. Obtain approval for all operations and present to the Owner, at the close of construction, signed copies of all required permits indicating successful completion of all permit requirements.
- D. Recycling Requirements: This project is subject to the Mendocino County "Construction and Demolition Recycling and Reuse" Ordinance and the Department of Toxic Substances Control "Requirements for Generators of Treated Wood Waste." and the requirements of California Green Building Standards Code (CALGreen).
- E. Other Requirements: All materials and workmanship shall comply with the most recent edition of any other codes or regulations adopted by governmental agencies having jurisdiction over any portion of the work.

1.5 PROJECT DATA:

- A. Construction Type: The proposed facility shall conform to all requirements for Type V-B construction as set forth in the most current edition of the California Building Code in effect at the time of construction with current State and local amendments.
- B. Occupancy Classification: The proposed facility shall conform to all requirements for Group B Occupancy as set forth in the most current edition of the California Building Code in effect at the time of construction with current State and local amendments.

1.6 WORK AREA AND USE OF PREMISES

- A. The project site is within the secure perimeter of the County's adult detention facility. The Contractor shall provide and maintain security fencing for the primary project area. Access to other parts of the campus must be coordinated with facilities staff.
- B. All employees of the Contractor and all subcontractors working within the Mendocino County Jail site will be required to clear a background check by the Mendocino County Sheriff's office. At least seven days prior to the start of work, the contractor is required, for each employee, to submit the employee's Name, Date of Birth, Social Security

Number and Driver's License state and number. Only those employees clearing the Sheriff's Department background check will be permitted on site.

- C. The Contractor shall use every precaution to insure the protection of and prevent damage to existing facilities on or adjacent to the construction area. Damage to existing facilities due to construction activities shall be repaired by the Contractor at no additional cost to the Owner.
- D. Bidders shall assume that they can use only the areas shown on Sheet E-101. Maintain the area clean and without damage to the surfaces or structures.

1.7 EXAMINATION

- A. General: As stipulated in Document 001000 Instructions to Bidders, Contractor is responsible for inspection of the existing site conditions prior to bidding and shall include in the Contract any modifications of the Contract Documents proposed as a result of Contractor's inspection. Such modifications shall be included in the bid.
- B. Persons performing work shall examine conditions that affect their work and shall report in writing to Contractor, with a copy to County, conditions detrimental to work.
 - 1. Failure to examine and report makes the person responsible, at no increase in the Contract Sum, for corrections necessary for the proper installation of their work.
 - 2. Commencement of Work constitutes acceptance of existing condition.
- C. Field Verification: Contractor shall verify all existing conditions in the field prior to commencing the Work.

1.8 PERMITS FOR WORK

Contractor shall obtain and meet any building permit requirements from the County of Mendocino Building Department. Contractor is responsible for scheduling and passing all required building inspections and securing final acceptance. Building permit fees are waived by the County.

1.9 LISTING OF RELATED WORK

Listings of related work or sections in the various Sections are not necessarily complete listings. They are provided for information and convenience only and are intended to highlight related or similar work

which is specified in other Sections. Related work listings and omissions from such listings are not intended to control Contractor in dividing the work among subcontractors or in establishing the extent of the work to be performed by any trade.

1.10 REQUEST FOR INFORMATION (RFI)

A. Requirement: It is Contractor's responsibility to review Contract Documents in advance of the work to be executed, and to request information so that County will have sufficient time to respond to Requests for Information prior to the start of actual construction of that part of the Work to which the RFI relates. Contractor shall be responsible for all delays, disruptions and other related impacts as a result of untimely RFI's submitted to County.

B. Contractor shall coordinate all requests for information to prevent duplication. Requests for information that are duplicative, uncoordinated with each other, or do not allow for a reasonable time for response will be returned to Contractor.

1. Contractor shall promptly notify County in writing of any discrepancies, and shall not proceed with the Work until such discrepancies have been resolved.
2. Failure to notify County shall not relieve Contractor of its responsibility for resulting damage and/or defect, and for the cost of any corrective work that may be required due to Contractor's failure to notify.

C. Contractor shall prioritize RFI's and request a response based on its most current and accepted CPM schedule.

D. Form:

1. When an interpretation or clarification of the Contract Documents is required from County, Contractor shall make the request on a form acceptable to the County.
2. Contractor shall limit the subject to one design discipline to expedite reply and attach supplementary information where necessary.
3. County will reply or give summary of reply on the same form and include supplementary information where necessary.
4. The completed form shall be the written record of each RFI.

F. Reply:

1. County will endeavor to reply to all RFI's promptly as work schedule of the consultants allows; generally no later than fifteen (15) days from the day received.
2. When an RFI involves a complex subject, extensive research or development, or substantial input from other governmental agency, County will inform Contractor and request additional time to prepare the reply. Contractor shall cooperate and agree to a reasonable time extension.
3. The reply shall be a clarification or an interpretation of the Contract Documents; the reply is not an authorization of change in the Contract Sum or Time.
4. Such written interpretation or clarification will be binding on Contractor and County. If County or Contractor believes that a written interpretation or clarification justifies an adjustment in the Contract Sum or Time, then County or Contractor may make a written request for change therefor as provided in the General Conditions, Article 20.

PART 2 - PRODUCTS (not applicable)

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PART 3 - EXECUTION (not applicable)

SECTION 01500

TEMPORARY FACILITIES & BUILDING SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide temporary facilities and controls needed for the Work including, but not necessarily limited to:
 - 1. Temporary utilities such as water, electricity, lighting and telephone;
 - 2. Temporary building services such as electricity, gas, heating and cooling or telephone and data when interruption in services is required to complete the work.
 - 3. Sanitary facilities;
 - 4. Enclosures and temporary protection such as fencing, tarpaulins, barricades and canopies.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary conditions, and Sections in Division 1 of these Specifications.
 - 2. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safe regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.
 - 3. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2 JOB SAFETY

- A. Comply with all applicable laws and regulations pertaining to job safety, and be solely responsible for construction means, methods, techniques, sequences procedures and safety precautions and programs in connection with the Work. Owner or Architect will not be responsible for Contractor's failure to employ proper safety procedures.
- B. All work, including the temporary construction, shall be in full accord with the latest orders, rules and regulations of the State of California Division of Industrial Safety and the California Occupational Safety and Health Act (CAL-OSHA).

- C. The Contractor shall at all times so conduct his work as to cause the least possible obstruction and inconvenience and insure the protection of persons and property in the vicinity of the Work.

1.3 TEMPORARY BUILDING SERVICES

- A. The electrical system being replaced with this project is serving a 24-7 public safety facility and includes a standby generator serving a number of emergency electrical panels throughout the campus identified on the plans.

- 1. The Contractor shall provide a power migration plan to address both of the following events. The plan shall provide for a maximum down-time of 3 hours for any service panel affected by the work.

- a. The existing stand-by generator is being removed and replaced. Beginning when the existing generator is disconnected and ending when the new generator is placed in service, the contractor shall provide back-up power and automatic transfer in the event of a power outage for the panels connected to the existing stand-by generator.
- b. During any extended power shut down including the change over to the new panel, the Contractor shall provide temporary service to each operating panel on this electrical service as shown on the drawings. The Owner shall provide portable generators adjacent to affected panel or feeder locations, and the Contractor shall provide all needed feeders and connections and ensure that generators are operational and providing power during the shutdown.

- 2. Pay the costs of installation, maintenance, operation, and removal of temporary generators including costs for fuel consumed.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS FACILITIES

- A. Construction Aids: Hoists, ramps and ladders, enclosures, pumps, barriers, fences, barricades necessary to adequately move materials and equipment and to protect workmen and public.

- B. All temporary construction to comply with requirements of state and local authorities.

2.2 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work areas to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

PART 3 - EXECUTION

3.1 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.
- B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit or as directed by the Architect.
- C. Remove temporary above grade or buried utilities, equipment, facilities, materials prior to Substantial Completion inspection.
- E. Clean and repair damage caused by installation or use of temporary work.
- F. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION 01500

SECTION 01640

PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Products, including Owner furnished items scheduled for use in the Work by means including, but not necessarily limited to those described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS

Except as otherwise approved by the County, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.4 PACKING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
 - 3. Immediately notify Owner of any damage to Owner Furnished – Contractor Installed (OFCI) items.
- B. The County may reject as non-complying such material and products that do not bear identification satisfactory to the County as to manufacturer, grade, quality, and other pertinent information.

1.5 PROTECTION

- A. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by Owner.

1.6 REPAIRS AND REPLACEMENTS

- A. In event of damage, promptly make replacements and repair to the approval of the County and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the County to justify an extension of the Contract Time of Completion.

END OF SECTION 01640

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Closeout procedures, Final cleaning, Adjusting, Project record documents, Operation and maintenance data, Warranties, Spare parts and maintenance materials, Summary of closeout submittals to County.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for County's inspection.
- B. Provide submittals to County that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Comply with procedures stated in the Conditions of the Contract Agreement and General Conditions for issuance of Certificate of Substantial Completion.
- E. Should County consider that the Work' is incomplete or defective, he will promptly notify the Contract in writing, listing the incomplete or defective items. The Contractor shall then take immediate steps to remedy the stated deficiencies, and send a second written certification to County that the Work is complete.
- F. Should County perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
 - 1. Owner will compensate County for such additional services.
 - 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.
- G. When the County finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

H. County will issue a final change order reflecting approved adjustments to Contract Sum not previously made by Change Order.

1.3 FINAL CLEANING

- A. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- B. Execute final cleaning prior to final inspection.
- C. Clean interior carpeted finished floors of stains and foreign substances, vacuum carpeted and soft surfaces.
- D. Clean walls, windows, and sills affected by the work of the contract to a dust free condition.

1.4 OPERATION AND MAINTENANCE DATA

- A. Compile data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
- B. Submit one copy of completed product data electronically.
- C. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with County comments. Revise content of documents as required prior to final submittal.

1.5 WARRANTIES

- A. Provide two copies.
- B. Submit prior to final Application for Payment.

1.6 FINAL PAYMENT

- A. The 10% retention shall be held by the Owner until Forty (40) days after Final Acceptance. If no liens or encumbrances are filed and if all work is complete, the retention shall be paid the Contractor. Assessed liquidated damages shall be deducted from the retention.
- B. Final payment to the Contractor will not be made until the Owner and County receive a signed-off final copy of the Building Permit, as applicable.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

(Not used)

END OF SECTION 01700

SECTION 01710

CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, conduct cleaning and disposal operations to comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.
- B. Provide covered containers for deposit of waste materials, debris and rubbish.
- C. Locate containers for deposit of waste materials, debris and rubbish as directed by owner.

2.2 COMPATIBILITY

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
 - 2. Do not allow accumulation of scraps, debris, waste material, and other items not required for construction of this Work.
 - 3. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

3.3 FINAL CLEANING

- A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.
- D. Schedule final cleaning as approved by the Construction Manager to enable the Owner to accept a completely clean finished installation.
- E. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed surfaces in all construction areas, to verify that the entire Work is clean.

END OF SECTION 01710.

SECTION 02010

SITE CONDITIONS

PART 1-GENERAL

1.01 RELATED INFORMATION

Related information and requirements are included in the General and Supplementary Conditions with regard to existing underground utilities.

1.02 INFORMATION ON SITE CONDITIONS

- A. All information obtained by the engineer regarding site conditions, subsurface information, groundwater elevations, existing constructions of site facilities, and existing underground utilities and similar data are shown on the plans or provided herein.
- B. Information derived from inspection of topographic maps, or from plans showing locations of utilities and structures will not in any way relieve Contractor from any risk, or from properly examining the site and making such additional investigations as he may elect, or from properly fulfilling all the terms of the contract documents.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall satisfy himself as to the nature and location of the work and the general and local conditions.
- B. The contractor further shall satisfy himself as to the character, quality, and quantity of surface and subsurface materials to be encountered by performing site inspections, reviewing soils report (if applicable) and reviewing any other pertinent information. Any new exploratory work must be approved by the owner. Failure of the contractor to acquaint himself with the site and all available information will not relieve him of the responsibility for properly estimating the difficulty or cost of completing the work.
- C. The Contractor shall anticipate underground obstructions such as utility lines, concrete, water table and variation hereof due to rainfall, soil conditions and debris. No extra payment will be allowed for the removal, replacement, repair or possible increased cost caused by underground obstructions. Any such lines or obstructions indicated on the map show only the approximate location and must be verified in the field by the Contractor. The Owner and Engineer will endeavor to familiarize the contractor with all known underground obstructions, but this will not relieve the Contractor from full responsibility in anticipating and locating all underground obstructions.

1.04. ADDITIONAL INFORMATION

Prior to bidding, bidders may make their own subsurface investigations subject to time schedules and arrangements approved in advance by the Owner. Before any subsurface test holes are excavated, obtain permits from governing agency to perform such work.

END OF SECTION 02010

SECTION 02070

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Carefully demolish and remove from the site those items scheduled to be demolished and removed.

1.2 APPLICABLE CODES AND REGULATIONS:

- A. General Requirements: See Specification Section 01010 - Summary of Work.
- B. Recycling Requirements: This project is subject to the Mendocino County "Construction and Demolition Recycling and Reuse" Ordinance and the Department of Toxic Substances Control "Requirements for Generators of Treated Wood Waste."
- C. Air Quality Requirements: All materials and workmanship shall comply with all current requirements of the Mendocino County Air Quality Control District. Provide all application materials, fees and documentation necessary to obtain all permits required by the Mendocino County Air Quality Control District. Obtain approval for all operations and present to the Owner, at the close of construction, signed copies of all required permits indicating successful completion of all permit requirements.

1.3 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 - PRODUCTS

(No products are required in this Section.)

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper

completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- B. Hazardous Building Materials should be presumed to be present in buildings and structures of this era, but it is not expected that hazardous materials will be encountered in areas to be selectively demolished.
 - 1. If suspected hazardous materials are suspected or encountered, do not disturb; immediately notify the County. Hazardous materials will be evaluated and if necessary removed by Owner under a separate contract.
- C. Fuel Tank Hazardous Waste Disposal
 - 1. The existing diesel storage fuel tank shall be emptied, cleaned and properly disposed of.
 - a. Removed fuel shall be retained and properly stored to fill the new generator tank.
 - b. Tank cleaning waste shall be disposed of as hazardous waste, provide chain of custody documentation of waste transport and disposal.
 - c. Cleaned tank may be disposed of as scrap metal.

3.2 DEMOLITION

- A. By careful study of the Contract Documents, determine the location and extent of selective demolition to be performed.
- B. In company with the County, visit the site and verify the extent and location of selective demolition required.
 - 1. Carefully identify limits of selective demolition.
 - 2. Mark interface surfaces as required to enable workmen to identify items to be removed and items to be left in place intact.
- C. Prepare and follow an organized plan for demolition and removal of items.
 - 1. Shut off, cap, and otherwise protect existing piped utilities or public utility lines in accordance with the requirements of the public agency or utility having jurisdiction.
 - 2. Completely remove items scheduled to be demolished and removed, leaving surfaces clean, solid, and ready to receive new materials specified elsewhere.
 - 3. In all activities, comply with pertinent regulations of governmental agencies having jurisdiction.
- D. Disposal of Materials

Contractor shall remove material generated by demolition activities which shall be disposed of off site by the contractor.

E. Salvage of Existing Materials

Remove existing materials identified in the Contract Documents which are suitable for reuse. Stack all salvaged materials in a safe place. Salvaged materials shall be protected from damage by the contractor until the completion of the demolition contract. Secure permission before storing salvage materials on site.

F. Temporary Protection: Provide temporary barricades, tarps and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

G. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

3.3 REPLACEMENTS

A. In the event of demolition of items not so scheduled to be demolished, promptly replace such items to the approval of the Architect and at no additional cost to the Owner.

END OF SECTION 02070

SECTION 02080

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Construction waste shall be managed in conformance with the applicable codes and regulations listed below.

1.2 APPLICABLE CODES AND REGULATIONS:

- A. General Requirements: See Specification Section 01010 - Summary of Work.
- B. Recycling Requirements: This project is subject to the Mendocino County "Construction and Demolition Recycling and Reuse" Ordinance and the Department of Toxic Substances Control "Requirements for Generators of Treated Wood Waste."
- C. This project is subject to the requirements of the most recent edition of the California Green Building Standards Code (CALGreen) with current State and Local amendments.

1.3 QUALITY ASSURANCE:

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 - PRODUCTS

(No products are required in this Section.)

PART 3 - EXECUTION

3.1 SITE AND SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. By careful study of the Contract Documents, determine the location and extent of construction waste management to be performed.
- B. In company with the Architect, visit the site and verify the extent and location of construction waste management required.
 - 1. Carefully identify limits of selective demolition.
 - 2. Mark interface surfaces as required to enable workmen to identify items to be managed according to the requirements of this section.
- C. Prepare and follow an organized plan for construction waste management.
 - 1. Establish a location on site for construction waste management tasks. Sort waste into required categories and stockpile materials until ready for disposal.
 - 2. Develop an organized plan for construction waste management and fully inform all employees of the requirements and conditions.
 - 3. Use means necessary to prevent dust, airborne debris and waterborne debris from becoming a nuisance to the public, to neighbors, workers and to other work being performed on or near the site.
- D. Disposal of Materials
 - 1. Completely remove items scheduled to be removed from site, leaving surfaces clean, solid, and ready to receive new materials specified elsewhere.
 - 2. In all activities, comply with pertinent regulations of governmental agencies having jurisdiction.

3.3 SUBMITTALS:

- A. Submit construction waste management plan, disposal confirmation and any other required documentation to governmental agencies having jurisdiction and County.

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Work included in this Section: "Provide" indicates all materials, labor, equipment, services, and incidentals necessary to install the Electrical Work indicated on the contract drawings and these specifications. Work includes, but is not limited to the following:
 - 1. Branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
 - 2. UPS system
 - 3. Coordination with Vendor's associated with the construction of the project.
 - 4. All necessary incidental work not specifically mentioned herein or shown on the drawings shall be provided for complete and functioning systems.
- B. Work specified in Division 26, 27, 28:
 - 1. Section 260519: 600-Volt Power Conductors and Cables
 - 2. Section 260526: Grounding and Bonding for Electrical Systems
 - 3. Section 260529: Hangers and Supports for Electrical Systems
 - 4. Section 260533: Raceway and Boxes for Electrical Systems
 - 5. Section 260553: Identification for Electrical Systems
 - 6. Section 263353: Static Uninterruptible Power Supply

1.2 INCORPORATED DOCUMENTS

- A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.
- B. Provide equipment and materials which conform to, and perform the installation thereof in accordance with the following codes and industry standards. The applicable version of each shall be that in effect as of the date of the Contract:
 - 1. National Electrical Code, latest edition (NEC).
 - 2. Uniform Building Code, latest edition (UBC)
 - 3. Underwriters' Laboratories, Inc. (UL).
 - 4. NFPA 101, Life Safety Code.
 - 5. Titles 8, 19 and 24 of the California Code of Regulations (CCR).
 - 6. American National Standards Institute (ANSI).

7. California State Fire Marshal (CSFM).
8. National Electrical Manufacturers' Association (NEMA).
9. Institute of Electrical and Electronics Engineers (IEEE).
 - a. National Electrical Safety Code (NESC).
 - i. Electrical Safety Orders.
 - ii. Other applicable local codes and ordinances.

10. All local, State and Municipal Codes and Ordinances.

- C. Where the authority-having-jurisdiction makes an interpretation or decision, as is their prerogative in accordance with the Code, such direction shall be considered a part of these Contract Documents as if contained herein. With respect to completing the intent of the Contract Documents, comply with any and all requirements of the authority-having-jurisdiction and utility company field inspectors, at no additional cost.
- D. The above referenced codes and standards are considered to be absolute minimum requirements. The Drawings and Specifications shall take precedence over the above referenced codes and standards where materials or workmanship of higher quality or larger size is indicated. Nothing in these Drawings or Specifications shall be construed to allow work not conforming to the applicable codes and standards

1.3 CONDITIONS AT SITE

- A. All bidders shall visit the project site and become familiar with the existing conditions prior to submission of bid. The act of submitting a bid shall indicate the Contractor to have familiarized themselves with all discernible conditions and has no exceptions to the existing conditions. There shall be no extra payment approved for work required due to existing conditions, whether specifically mentioned or not.
- B. Lines of other services that are damaged as a result of this work shall promptly be repaired complete to the satisfaction of the Owner at no additional expense to the contract.

1.4 REVIEW OF CONTRACT DOCUMENTS

- A. Examine all relevant Contract Documents including Drawings, Specifications, and Shop Drawings in order to become acquainted with the Work of other installers whose activities will adjoin or be affected by the Electrical Work.

1.5 PERMITS, LICENSES, AND FEES

- A. Procure and pay for all permits, licenses and fees that are required to carry out and complete the Electrical Work.

- B. Pay for building department or utility company imposed inspection fees.
- C. Pay utility company charges for normal or after hours shutdowns, service calls, repairs, and cable locating that are directly related to the installation of the Electrical Work.

1.6 SITE VERIFICATION OF INFORMATION

- A. Visit the project site prior to submitting a bid and verify the condition, location and dimensions of buildings, equipment, and facilities. The act of submitting a bid shall indicate the Contractor to have familiarized themselves with all discernible conditions and has no exceptions to the existing conditions. There shall be no extra payment approved for work required due to existing conditions, whether specifically mentioned or not.
- B. Verify at the project site, the accuracy of information shown on the Drawings regarding existing equipment, materials, and facilities. This includes but is not limited to: size, type, rating, quality, age, and serviceability. No allowance will be made on behalf of the Contractor for extra expenses resulting from the failure to discover conditions affecting the Work.
- C. Lines of other services that are damaged as a result of this work shall promptly be repaired complete to the satisfaction of the Owner at no additional expense to the contract.

1.7 WORKING SPACE

- A. Maintain adequate work space around, and access to, electrical and mechanical equipment in strict accordance with the applicable Codes. Verify during the course of construction that sufficient space will be available for the installation equipment, fixtures, etc.

1.8 QUALITY ASSURANCE

- A. Conformance:
 - 1. The Contractor shall notify the Owner's Representative, prior to submission of bid, about any part of the design which fails to comply with abovementioned requirements.
 - 2. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on drawings or covered in the specifications, they shall be included at Contractor's expense.
- B. Coordination:
 - 1. The Contractor shall become familiar with the conditions at the job site, contract

- drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Owner's Representative approval before work proceeds in these areas. No additional costs will be considered for work which must be relocated due to conflicts with the work of other trades.

1.9 MATERIALS AND SUBSTITUTIONS

- A. Materials shall be new, high quality, free from defects, of standard make, and of the brand or grade as shown on the Drawings or specified herein. Specific trade names are used in the Drawings and Specifications in order to establish the standard grade and characteristics of said items. This does not imply the right upon the part of the Contractor to use other materials or methods without the approval of the Architect.
- B. Electrical materials and equipment shall bear the label of, or be listed by, the Underwriters' Laboratories (UL) wherever standards have been established and label service is regularly furnished by that agency. Comply with the installation and application requirements of UL as documented in their published directories.
- C. Unless specifically noted, equipment and systems shall be the product of a manufacturer who has been in the manufacture of, and has nationally distributed catalogs covering the ratings and specifications of, said equipment or systems, for a period of not less than five (5) years.
- D. Maintain uniformity throughout the Project by making use of only one make or brand of material for each material used.
- E. Substitutions of materials or methods will only be allowed if such items are approved in writing by the Architect as equal in quality and utility to the specified items. Submit a list of proposed substitutions within thirty (30) days of the award of the Contract. Include on the list the original manufacturer's name and model number, the proposed manufacturer's name and model number, catalog cut sheets, ratings, sizes, performance curves, shop drawings, and other data as may be required to demonstrate equality to the specified item.
- F. The approval of a substitution does not authorize any deviation from the utility, size, function, or durability of the specified item unless specifically pointed out and requested in the proposed substitution list, and said deviation is approved in writing by the Architect. Responsibility of the Contractor for dimensional considerations or space conflicts is not relieved by the approval of a substitution.
- G. If requested by the Architect, submit samples of materials and equipment for approval prior to installation.

- H. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether Owner's Representative, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.
- I. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.
- J. Where required by Owner's Representative to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 ELECTRICAL SUBMITTALS

- A. See the General Conditions for conditions of submittal approval and general requirements for submission of shop drawings.
- B. Submit electrical shop drawings and manufacturer's cut sheets for equipment and materials as noted in each Division 26 specification section. Bind the submittals as complete volumes according to classification of equipment such as power, lighting, fire alarm, etc. When possible, make all electrical submittals at the same time.
- C. Submit shop drawings and supporting data as instruments of the Contractor. Stamp each item in the submittal documents with the Contractor's stamp, thereby stating that the equipment meets all requirements and conditions of the Drawings and Specifications. In particular, certify that the items shown on the shop drawings conform to the dimensional, environmental, and space restrictions as pertains to all work under this Contract and the work of other parties in conjunction with this Project.
- D. Provide a blank space on the title page of each submittal classification for the Architect's or Engineers approval stamp and comment field. The minimum size of such space shall be eight inches wide by five inches high.
- E. Arrange panelboard submittals to show bussing, circuit numbering, and branch circuit protective devices similar the schedules on the Drawings. Show elevations of switchboards, motor control centers, and distribution centers indicating the layout of devices, meters, handles, etc. Provide device ratings, circuit numbers, and nameplate descriptions in table form. Include terminal strip mounting arrangements on elevations for terminal cabinets.

1.11 DRAWINGS AND SPECIFICATIONS

- A. The data and information contained on the Drawings is as accurate as was reasonably possible at the time they were produced, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc., will be dictated by the actual building and the conditions at the site.

- B. The layout of electrical equipment, wiring, and accessories is shown in a diagrammatic fashion (not pictorially) in order to achieve clarity and legibility. Although the size and location of electrical equipment is drawn to scale wherever possible, refer to all data in the Contract Documents and field verify this information as the project progresses. Examine architectural, structural, mechanical, and other drawings to determine the exact location of conduits, outlets, fixtures, and equipment and to note any conditions which may affect the electrical work.
- C. The Drawings and Specifications may be superseded by later detail drawings and specifications prepared by the Architect. Conform to such detail drawings, specifications, addenda, change orders, other reasonable changes as if they are contained herein. See the General Conditions for change order cost considerations.
- D. Because the Electrical Drawings may be distorted for clarity of representation, it may be necessary to field verify the exact location of electrical outlets, lights, switches, etc. in order to conform to the architectural elements. The Architect reserves the right to make minor changes to the locations of equipment, devices, and wiring shown on the Drawings, at no additional cost, providing the changes are ordered before the rough-in of conduit, boxes, or related items is completed, and no extra material are required.
- E. For dimensional and locational purposes, the Architectural Drawings take precedence over the Electrical Drawings. Determine the appropriate location of lighting fixtures, outlets, wall-mounted devices, etc. by studying the reflected ceiling plans, building sections, and interior elevations. Report conflicting conditions to the Architect before rough-in for adjustments to the locations.
- F. Conduit quantities, sizes, termination points, and wiring are depicted on the Electrical Drawings. However, not all conduit bends or routing details are necessarily shown. Route conduit so as to conform to the structural conditions, avoid obstructing other trades, maintain space restrictions and keep circulation areas and access openings clear.
- G. Thoroughly examine the Contract Documents prior to submitting a bid in order to determine electrical requirements which are not necessarily indicated on the Electrical Drawings. Include sufficient allowance in the bid sum to cover the costs of these other requirements.
- H. Should the Contractor perceive that the Drawings and Specifications do not sufficiently define the intent of electrical work, contact the Architect for clarification or additional information. The absence of such contact will be considered as evidence of understanding, on the part of the Contractor, of the intended Electrical Work and the required installation thereof.

1.12 WORKMANSHIP

- A. Constantly supervise the work personally or through an authorized and competent representative. Keep the same foreman or supervisor on the project from commencement through completion.
- B. Perform the Electrical work using the highest caliber craftsman available. Workmanship shall be first class and of the best quality available to insure a long and trouble free service life. Allow only experienced and competent workmen on the job.

1.13 COOPERATION AND COORDINATION

- A. Consult with the other installers and trades in coordinating the Work so as to avoid conflicts, omissions and delays. Cooperate with other contractors, third parties, and the Owner in order to expedite the project and provide for the proper execution of the building as a whole. Work performed without regard to other trades or the overall project scheme, may necessarily be required to be moved at the Contractor's expense.

1.14 MANUFACTURER'S DIRECTIONS

- A. Adhere to the manufacturer's directions regarding the proper installation and configuration of electrical equipment where those directions cover points not included in these Drawings and Specifications.

1.15 PROTECTION AND STORAGE

- A. Use all means necessary to protect the materials of this Division before, during, and after installation and to protect the work and materials of all trades.
- B. Deliver electrical materials to the site new, and in unbroken packages. Provide for the temporary storage of such materials, equipment, and construction tools in accordance with the General Conditions and in strict accordance with approved manufacturers' recommendations. Protect electrical equipment and materials during transit, storage and handling to prevent damage, soiling and deterioration.
- C. During shipping storage and handling protect electrical materials from damage of any type including dust, water, over-spray, and temperature.
- D. Avoid damage during construction to the work and materials of other trades as well as the electrical work and material. Repair or replace, at the Contractor's expense, defective or damaged items such that the entire Work is completed in a condition satisfactory to the Architect.

- E. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.
- F. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.16 EXCAVATION, CUTTING, PATCHING, AND REPAIR

- A. Perform excavation and backfill required for the installation of electrical sub-structures. Restore grounds, walkways, roadways, curbs, walls, and other existing underground facilities to their original condition.
- B. Conform to the applicable requirements of Division 2, Earthwork for Utilities, in the selection, placement, and compaction of backfill material and finished surfaces.
- C. Cut, core-drill, and demolish existing walls, floors, ceilings and other building surfaces as required for the installation of Electrical Work. Obtain the approval of the Architect prior to performing any operation which may affect any structural elements of the building.
- D. Patch and repair wood, plaster, tile, or concrete surfaces which have been damaged by the installation of the Electrical Work so that the finished surface matches the surrounding conditions.

1.17 FLASHING, WATERPROOFING AND SEALING

- A. In general, install in an approved watertight manner, Electrical Work which pierces exterior walls or waterproofing membranes. Flash and counter-flash roof and wall penetrations in a manner described in other applicable sections of this Specification and as approved by the Architect.
- B. Fit conduits passing through finished walls with steel escutcheon plates of brass, chrome, or painted finish as directed by the Architect. Grout penetrations of floor slabs, concrete or masonry walls with an approved grout or silicone elastomeric caulk.

1.18 EARTHQUAKE RESISTANT INSTALLATION/FASTENING:

- A. All electrical equipment and raceways shall be anchored to withstand forces generated by earthquake motions. As a minimum, equipment and equipment frames shall be designed to withstand a force of 25% of the weight of the equipment and frame acting at its center of gravity. Anchorage of the equipment and/or frame to the structure shall be for a force of 50% gravity also acting at the center of gravity.

- B. For Main Switchboard and Automatic Transfer Switch, Generator, UPS, Battery Racks, PDU's, and Cable Tray, the above values shall be doubled. Design stresses in either case may be increased 1/3 over normal allowable stresses but never beyond yield.

1.19 CLEANING, ADJUSTING, AND TOUCH-UP

- A. Remove on a daily basis electrical debris, scraps, packaging material and other rubbish. Dispose of such items off-site in an approved manner and debris. Maintain the site free from physical hazards at all times. See the General Conditions for additional requirements.
- B. After installation, completely clean electrical equipment, fixtures, and materials of excess paint, over-spray, plaster, cement, insulating products, and other foreign matter. Leave the Electrical Work in a clean, finished, dry, level, like new condition.
- C. Touch-up paint scratches and scuffs on electrical equipment and lighting fixtures with paint recommended by the manufacturer and matching the original item finish.
- D. Make setting, adjustments, and programming in accordance with the manufactures' operating and installation instructions. Settings and program variables will be issued by the Architect prior to commissioning of the electrical system.

1.20 AS-BUILT DRAWINGS

- A. Throughout the project, maintain accurate and current record documents. Show on the record drawings deviations from the Electrical Drawings, locations of underground conduits and pull-boxes, and concealed equipment which is not readily apparent. Dimension the record drawings using permanent, readily identified benchmarks such as column or wall lines.
- B. At the completion of the project, present one clearly legible set of the record drawings to the Architect.

1.21 SCHEDULING/SEQUENCING

- A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.
- B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied

equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.22 INSPECTIONS AND TESTING

- A. Arrange for the inspection of the Work at various stages of completion by the Authority Having Jurisdiction, utility company representatives, and the Architect. Comply with all directions and remedial measures issued thereby. Any objections to these orders on the part of the Contractor must be presented to the Architect in writing within forty eight (48) hours of the inspection report.
- B. Coordinate the installation of the Work so that observation of all rough-in, concealed, or underground Work can take place by the Architect. Provide a minimum of seventy two (72) hours notice to the Architect prior to covering up the work. Uncover Work that has not been properly observed and make repairs to restore the Work and adjoining surfaces to their proper condition at no additional cost.
- C. Perform tests of the electrical system during the course of the project and at project completion to ensure safe and proper function in accordance with the Contract Documents, manufacturers' recommendations, and applicable codes. Provide complete documentation of all test results to the Architect prior to project completion. Testing shall include, but not necessarily be limited to, the following:
 - 1. Test for short circuits, open circuits, neutral leakage, and improper grounds on feeders and branch circuits. Perform this test with mains in disconnect from feeders, branch circuits closed, fixtures and devices permanently connected, lamps removed from sockets and wall switches closed.
 - 2. Provide insulation resistance tests of all phase and neutral circuit conductors using a 500 Volt Megger for circuits of 240 Volt rating and below, and a 1000 Volt Megger for circuits of 277 volts and above. Minimum acceptable insulation resistance is one (1) megohm.
 - 3. Perform a ground resistance test of each main grounding electrode system, ground rod, and supplemental grounding electrode. Utilize a calibrated, direct reading, earth ground test set and make the tests using the "Three-terminal, Fall-of-Potential" method. The maximum allowable earth ground resistance is 25 ohms.
 - 4. Test for proper phase-to-phase and phase-to-neutral operating voltage on the main service and on each separately derived system. Perform this test at full load and at no load. With all circuits at full operating conditions, test the phase and neutral load currents using a clamp-on ammeter.
 - 5. When series rated circuit breakers are used, provide a letter from the manufacturer of the equipment confirming that U.L. series rating exists for all protective devices. State the available fault current from the Utility Company and indicate that the overcurrent devices exceed the available fault current at the respective point of protection.

6. Seismic restraint calculations for equipment, by a Registered Structural Owner's Representative, per Paragraph 3.5 of this Section.
 7. Tests as required by other sections of these Specifications.
 8. Tests as prescribed by individual equipment manufacturers whether or not described in these Specifications.
- D. At project completion, demonstrate to the Architect that the entire installation is complete, in proper operation condition and that the Contract has been properly and fully executed. Activate all circuits, lights, devices, and controls under full load and normal operating conditions. Identify faulty items and immediately replace or repair defective equipment, workmanship, and materials to like new condition and retest in the presence of the Architect.
- E. At the completion of the Project, demonstrate to the Architect that the entire electrical system is free from short circuits and improper grounds, or upon request of the Architect anytime, make necessary tests under the observation of the Architect which will ensure that electrical equipment, materials and installation methods are as specified.

1.23 IDENTIFICATION

- A. Each branch circuit of panelboards to have a permanently fixed number with one word directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of equipment supplied by breakers, including location.
1. All existing panelboards touched shall be updated with new panel schedules.
 2. All existing equipment on existing panel schedules shall be transferred to new panel schedules.
- B. Provide label on all motors: "*Caution. Automatic equipment .May start at any time.*"
- C. Provide identification of all pull boxes, junction boxes, and conduit stub-ups on the project as outlined below:
1. For Power Feeders:
 - a. Stencil cover with identifying circuit number.
 - b. Lettering 1" high.
 - c. Color of lettering black.
 - d. Place lettering on cover in neat manner; run parallel to long sides of box.
 2. For branch circuits, grounding, communication, signal, and control systems boxes and blank conduit stub-outs. Paint inside back of each j-box, front of each cover, and ends of each blank conduit stub-out with identifying system color as listed below:

<u>System</u>	<u>Color</u>
120/208 volt	Blue

Telephone/Data
Ground system
Fire Alarm

Grey
Green
Red

1.24 GUARANTEE

- A. In accordance with Division 1 requirements.

1.25 PERMITS AND INSPECTIONS

- A. This Contractor shall obtain and pay for all required permits and arrange for all inspections required.
- B. Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

1.26 WARRANTIES, CERTIFICATES, AND OPERATING MANUALS

- A. Properly fill out and deliver to the Owner, all warranties, guarantees, certificates, etc. for equipment and materials that are furnished and installed under this Section of the Work. The effective date on each item shall be the date of acceptance of the work by the Owner.
- B. Deliver to the Owner, a minimum of two (2) copies of the manufacturers' operating and maintenance manuals for major items of equipment.

END OF SECTION

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

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

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.4 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 NFPA 70.

PART 2 - PRODUCTS

2.1 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:
1. Wire and Cable (600V)
 - a. American Wire Company
 - b. Belden
 - c. General Wire and Cable Corporation

- d. Okonite Company
- e. Rome Cable Corporation
- f. Cerrowire
- g. American Insulated Wire
- h. AFC Cable Systems
- i. Essex
- j. Simplex Wire and Cable Company

2. Solderless Lugs and Grounding Connections

- a. Burndy Engineering Company, Inc.
- b. O.Z. Gedney Company, Inc.
- c. Penn Union Electric Corporation
- d. Thomas and Betts Company, Inc.

2.2 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

2.3 CONNECTORS AND SPLICES

- 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:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. 600-volt class, insulation color coded, minimum No. 12 AWG for branch circuits, No. 14 AWG for control circuits.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- B. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- D. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- F. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- G. Class 2 Control Circuits: Type THHN-THWN, in raceway.
- H. Insulation type:
 - 1. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75 degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
 - 2. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- D. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."
- E. 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.
- F. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- G. Install all wiring (low voltage and line voltage) in conduit unless noted otherwise in the drawings, but do not pull into conduit until plastering and taping have been completed and conduits and outlets have been thoroughly cleaned and swabbed as necessary to remove water and debris.
- H. Approximately balance branch circuits about the neutral conductors in panels.
- I. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
- J. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
- K. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
- L. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

Voltage	Phasing	A	B	C	N
120/208	3PH-4W	Black	Red	Blue	White
208	3PH-3W	Black	Red	Blue	--

- M. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
- N. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.

3.4 INSTALLATION OF DICONNECTIONS, CONNECTORS, AND LUGS

- A. Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic only. The

contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.

1. Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V or 480V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).
 2. Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.
- B. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; "Scotchlock" fixed spring type with insulator for No. 6 and smaller wire.
1. All splices made up with wire nut connectors shall be solidly twisted together with electricians pliers before connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
 2. Connectors listed or labeled for "no wire twisting required" are not an acceptable substitute for actual wire twisting.
 3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).
- C. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
1. Provide watertight cast splices for all conductors in site pull boxes or wet locations.
- 3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."
- B. Fire stopping: 3M Fire Protection Products or equal.
 - 1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, and at other construction gaps.
 - 2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors 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. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 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.
- 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 260519

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 4/0 AWG minimum. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.

4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
 8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- B. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Install ground wires in rigid conduit.
- C. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
- D. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment.
- E. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
- F. Other than for isolated ground receptacles, provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
- G. Ground all isolated sections of metallic raceways.
- H. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures

- I. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Requirements for Electrical Installations" The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
 - 4. Test system using the three-point fall of potential method only. Record results and submit to Architect for approval.
- B. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3ohm(s).

- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.

1.2 PERFORMANCE REQUIREMENTS

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

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. 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:
 - 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.
 - h. General Electric Company
 - i. Republic Steel Corporation
 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. 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:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, 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. 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:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and 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: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts
 - 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 by means that meet seismic-restraint strength and anchorage requirements.

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

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 Section "Exterior Paints" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface and buried raceways, wireways, outlet boxes, pull boxes, junction boxes, hand holes and concrete manholes.

1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260519: 600-Volt Power Conductors and Cables
- C. Section 260526: Grounding and Bonding for Electrical Systems
- D. Section 260553: Identification for Electrical Systems

1.3 REFERENCES - CODES AND STANDARDS

- A. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.6 American National Standard for Electrical Intermediate Metal Conduit.
- D. ASTM A 48 Standard Specification for Grey Iron Castings.
- E. NECA (National Electrical Contractor's Association) – "Standard of Installation."
- F. NEMA FB 1 (National Electrical Manufacturers Association) – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- G. NEMA OS 1 (National Electrical Manufacturers Association) – Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- H. NEMA OS 2 (National Electrical Manufacturers Association) – Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- I. NEMA RN 1 (National Electrical Manufacturers Association) – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

- J. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit.
- K. NEMA TC 3 (National Electrical Manufacturers Association) – PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- L. NEMA TC 6 - Non-Metallic Conduit.
- M. NEMA 250 (National Electrical Manufacturers Association) – Enclosures for Electrical Equipment (1,000 Volts Maximum).
- N. NFPA 70 National Electrical Code (NEC). Latest approved edition
- O. UL 1 Flexible Metal Conduit
- P. UL 6 Rigid Metal Conduit
- Q. UL 514B Conduit, Tubing and Cable Fittings.
- R. UL 651 Rigid Non-Metallic Conduit
- S. UL 797 Electrical Metallic Tubing
- T. UL 1242 Intermediate Metal Conduit

1.4 SYSTEM DESCRIPTION

- A. Raceway, boxes and manholes located as indicated on drawings and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway, boxes and manholes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground more than 5 feet (1,500 mm) outside foundation wall: Provide Schedule 40 non-metallic conduit.
- C. Underground within 5 feet from foundation wall: Provide rigid steel or Schedule 40 non-metallic conduit.
- D. In or Under Slab on Grade: Provide Schedule 40 non-metallic conduit encased in concrete. Provide Galvanized with tape wrap rigid steel factory bends greater than 22.5 degrees and for stub-ups through concrete slabs.
- E. Outdoor Locations, Above Grade: Provide rigid steel conduit. Provide cast metal outlet, pull, and junction boxes.
- F. In Slab above Grade: Provide galvanized rigid steel conduit. Provide cast or concrete-tight sheet metal boxes.
- G. Exposed Dry Locations: Provide galvanized rigid steel conduit. Provide cast boxes.

- H. Concealed Dry Locations: Provide electrical metallic tubing for sizes less than 2-inches. Provide galvanized rigid steel or intermediate steel conduit in sizes 2-inches or larger. Provide cast or sheet metal boxes.
- I. Locations subject to Corrosive Atmosphere: Provide PVC coated, galvanized rigid steel or intermediate steel conduit. Provide PVC coated cast or sheet metal boxes.
- J. Hazardous Locations (Per NEC Article 500): Galvanized rigid steel conduit. Cast iron boxes with threaded hubs for conduit entry. Conduit seals.

1.5 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch (19 mm) unless otherwise specified.

1.6 SUBMITTALS

- A. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency having jurisdiction. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- B. Submit detailed conduit routing plan, for review and approval, prior to installation as follows:
 - 1. Exposed and/or concealed in building walls for conduits larger than 2-inch outside diameter.
 - 2. All underground conduits (3/4-inch and larger) in duct bank; concealed in floor slabs, equipment pads and concrete slabs.
- C. Product Data: Submit for the following:
 - 1. Rigid Steel Conduit.
 - 2. PVC Coated galvanized rigid steel conduit.
 - 3. Intermediate steel conduit.
 - 4. Electrical Metallic Tubing (EMT).
 - 5. Flexible metal conduit.
 - 6. Liquid tight flexible metal conduit.
 - 7. Nonmetallic conduit.
 - 8. Raceway fittings.
 - 9. Conduit bodies.
 - 10. Surface raceway.
 - 11. Pull boxes, junction boxes and manholes.
- D. Manufacturer's Installation Instructions:
 - 1. Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

2. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.7 CLOSEOUT SUBMITTALS

A. Project Record Documents:

1. Record actual routing of conduits. Provide record (as-built) drawings marked in red to show actual routing of the underground raceway and cable when different from the original contract drawings. Prepare on new, clean set of contract drawings.
2. Record actual locations and mounting heights of outlet, pull boxes, junction boxes and manholes.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC and PVC-coated metallic conduit from sunlight.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Galvanized Rigid Steel Conduit (GRSC or RGS), couplings and elbows shall be hot-dip galvanized, rigid mild steel in accordance with ANSI C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous zinc coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Conduit shall be formed with continuous welded seams with a uniform wall thickness, in minimum 10-foot lengths, with threaded ends.
- B. Intermediate Metal Conduit (IMC). Raceway shall be hot-dipped galvanized mild steel in accordance with ANSI C80.6 and UL 1242 and shall bear the UL label. Conduit shall have same characteristics of rigid steel except for thinner wall.
- C. Polyvinyl Chloride (PVC) coated galvanized rigid steel conduit and intermediate metal conduit shall be in accordance with NEMA RN 1. Coating shall be applied under controlled factory conditions. Prior to coating, conduit shall meet requirements of ANSI C80.1 and UL 6 or ANSI C80.6 and UL 1242 as appropriate. PVC coated conduits shall have ultra-violet (UV) inhibitor in the coating material.
- D. Electrical Metallic Tubing (EMT). Electrical metallic tubing, including elbows and bends, shall be zinc coated, mild steel in accordance with the requirements of ANSI C80.3 and UL 797. The interior and exterior surfaces of the tubing shall have a

continuous zinc coating. Conduit shall be formed with a continuous welded seam, with a uniform wall thickness, in minimum 10-foot lengths.

- E. Flexible Metal Conduit shall be galvanized steel meeting the requirements of UL 1. Flexible aluminum conduit is not permitted.
- F. Liquid-Tight Flexible Metal Conduit shall be plastic-jacketed, galvanized steel, "Sealtite" Type EF for general service areas or Type HC for high-temperature when used under raised floor or in air plenums. Conduit shall be UL listed.
- G. Non-Metallic Conduit shall be as follows:
 - 1. Schedule 40: Conduit shall be 90 degree Celsius, polyvinyl chloride in conformance with NEMA TC-2 and UL 651 requirements.
 - 2. Spacers used in duct bank installations shall be high impact plastic, interlocking bases, and intermediate type spacers. Place spacers between 6 and 10 feet apart.
- H. Rigid aluminum conduits and flexible aluminum or non-metallic conduits are not permitted on this project.

2.2 RACEWAY FITTINGS

- A. Couplings and Thread Protectors. Each length of threaded conduit shall be provided complete from the manufacturer with a coupling on one end and a thread protector on the other. The thread protector shall have sufficient mechanical strength to protect the threads during normal handling and storage.
- B. Metal Conduit Fittings shall conform to the requirements of UL 514B where this standard applies. Galvanized steel fittings shall be used with steel conduit. Threaded fittings shall engage a minimum of five threads made up wrench-tight and be compatible with conduit. EMT fittings shall be compression type, UL approved for rain tight applications and setscrew type with insulated throat for indoor applications.
- C. Liquid-Tight Flexible Conduit Fittings shall be galvanized steel, T&B 53XX series insulated throat, and shall bear the UL label. Die-cast malleable fittings are not acceptable.
- D. Liquid-Tight Flexible Metal Conduit Fittings shall be galvanized steel similar to T&B "Tite-Bite".
- E. Non-Metallic Conduit Fittings shall be of same material and strength characteristics as the conduit and shall be solvent welded as recommended by manufacturer. End bells shall be plastic, high impact, tapered to fit. Where conduit transition from non-metallic to metallic is required, provide non-metallic female "terminal" adapter. Non-metallic "male" adapters are not acceptable.

- F. Special Fittings. Conduit sealing, explosion proof, dust proof, and other types of special fittings shall be provided as required and shall be consistent with the area and equipment with which they are associated. Fittings installed outdoors or in damp locations shall be sealed and gasketed. Outdoor fittings shall be of heavy cast construction. Hazardous area fittings and conduit sealing shall conform to NEC requirements for the area classification.
- G. Bushings shall be provided for the termination of all conduits not terminated in hubs, couplings or insulated throat connectors. Grounding type insulated bushings with insulating inserts in metal housings shall be provided for conduit 1-1/4 inches and larger. Standard bushings shall be galvanized steel or malleable iron in all sizes.
- H. Locknuts. One interior and one exterior locknut shall be provided for all conduit terminations not provided with threaded hubs and couplings. Locknuts shall be designed to securely bond with the conduit to the box when tightened. Locknuts shall be so constructed that they will not be loosened by vibration.
- I. Unions. Watertight conduit unions shall be Appleton or Crouse-Hinds Type UNF or UNY, or approved equal.
- J. Raintight Conduit terminating hubs, where indicated on the drawings or required by these specifications, shall be Meyer's rigid conduit hubs, or approved equal.

2.3 CONDUIT BODIES

- A. Aluminum conduit bodies shall be die-cast copper-free aluminum alloy A360. Aluminum conduit bodies shall be finished with powder-coated paint. Cover shall be die-cast or stamped aluminum or steel. }
- B. Malleable iron conduit bodies shall be cast malleable iron with tensile strength meeting ASTM A 48, Class 30A requirements. Malleable conduit bodies shall be finished with an epoxy powder coating. Cover shall be malleable iron with captive screws.
- C. All conduit bodies' entrances shall be machined NPT threads with a smooth, rounded, internal conduit stop bushing.
- D. All conduit bodies shall be equipped with a sealed and gasketed cover. Cover shall be secured using stainless steel machine screws.

2.4 CONDUIT SUPPORTS

- A. Conduit supports shall be furnished and installed in accordance with other section of these specifications. Conduits shall be supported so that fittings are accessible. Support systems shall be limited to electrical conduits only.

- B. Hanger rods shall be 3/8-inch diameter galvanized threaded steel rods, minimum. Conduit racks over 18-inch wide, over one level, or supporting 2-inch RSC or larger, shall be 1/2-inch diameter rod minimum.
- C. Conduit Clamps. Conduits in single runs or groups of two shall be supported by steel clamps and clamp backs. They shall be galvanized malleable iron or approved equal cast ferrous metal for steel conduit or tubing.
- D. Support Channels. Supports for banks of three or more conduits shall be constructed of formed steel support channels (Unistrut, Kindorf, Superstrut, B-Line or approved equal) with associated conduit or tubing clips. Support channels shall be steel, hot-dip galvanized after fabrication with galvanized steel clips for steel conduit or tubing.
- E. Wall Penetrations. All conduits, raceways, cables and sleeve penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed with a UL-approved fire stopping system, in accordance with specification Section 16060 – Basic Electrical Materials and Methods.

2.5 OUTLET BOXES AND SWITCH BOXES

- A. Manufacturers: Firms regularly engaged in the manufacturing of electrical raceways of the types and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized flat rolled sheet steel outlet wiring boxes of types, shapes and sizes, including box depths, to suit each respective location and installation; construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.
- C. Outlet boxes used in wet outdoor locations, surface mounted shall be cast metal (FS or FD type) with mounting lugs and gasketed covers.
- D. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported, per NEC requirements.
- E. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.6 PULL BOXES, JUNCTION BOXES, HANDHOLES AND MANHOLES

- A. Sheet Metal Boxes shall be NEMA OS 1, NEMA rating as indicated on drawings. Minimum 16 gauge galvanized steel construction with stainless steel hinged cover and neoprene gasket. Cover shall be secured to the body with a continuous, full length,

piano type hinge and stainless steel pin on one side and captive screw on the other side. Door shall be equipped with padlock hasp with sealing hole provisions.

1. Provide #10-32 tapped hole provisions for optional ground lug kit.
 2. Provide 0.375-16 collar studs for mounting optional panel.
 3. Provide external mounting feet for secure wall mounting.
 4. Finish: Wash and phosphate undercoat with ANSI 61 gray polyester power finish.
- B. Surface-Mounted Cast Metal Box: NEMA 250, NEMA Type 3R or 4 as indicated, flat-flanged, surface- mounted junction box:
1. Material: Cast Iron.
 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- C. Concrete pull boxes, vaults and hand holes for power, lighting, controls and telecommunications shall be pre-cast concrete boxes, sized as indicated on the drawing or per NEC requirements. Pull boxes shall be equipped with a concrete cover for non traffic rated locations OR cast-in frame, galvanized steel, adjustable, high impact traffic cover (H-20 load rated), sump, lifting lugs, and conduit knock-outs. Knockout location and sizes shall be coordinated with the duct bank for each location. Cover shall be engraved with the words - – “POWER”, “LIGHTING”, “CONTROLS”, “COMM/DATA”, “TELEPHONE” or similar as applicable.
- D. Concrete manholes and/or pull boxes for buried power (MH-P-xx) and control (MH-C-xx) conduits shall be either cast-in-place or pre-cast concrete vault.
1. Size, as indicated on the drawings or per NEC requirements.
 2. Pull boxes, Vaults and Manholes shall be equipped with:
 - a. Galvanized steel covers for non-traffic rated locations and cast-in frame, galvanized steel, adjustable, high impact traffic cover (H-20 load rated) for traffic rated locations.
 - b. Sump, lifting lugs, conduit knock-outs, pick holes, bolt down holes in cover plate, and pull irons. Knockout location and sizes shall be coordinated with the duct bank for each location. HDG cable racks shall be provided as required to support the cables in the pull box. Cover shall be engraved with the words “POWER”, “LIGHTING”, or “CONTROLS” as applicable.

2.7 CLOSURE FOAM

- A. All conduit, raceways, cables and sleeves penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed by closure foam as in Dow Corning #3-6548 silicone RTV, GE RTV 850 silicone foam, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to rough in.

3.2 EXISTING WORK

- A. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
- B. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION OF RACEWAYS

A. Routing

1. Install raceway and boxes in accordance with NECA "Standard of Installation."
2. Conduit routing shown on drawings is diagrammatic only. Contractor shall field route conduit and raceways between equipment and devices as required to obtain a complete wiring system.
3. Conduit shall not be exposed unless specifically mentioned on the drawings or accepted by the architect.
4. All exposed conduits shall be installed parallel or perpendicular to dominant surfaces with right-angle turns made of symmetrical bends or fittings.
5. Conduit shall not be installed on the outside face of exposed columns, but shall be routed on the web or on the inside of a flange of the column.
6. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members.
7. Conduit shall be located at least 6 inches from hot water or steam pipes and from other hot surfaces

B. Moisture Pockets

1. Moisture pockets shall be eliminated from conduits. If water cannot drain to the natural opening in the conduit system, a hole shall be drilled in the bottom of a pull box or a "C-type" conduit fitting provided in the low point of the conduit run.

C. Couplings and Unions

1. Metal conduit shall be joined by threaded conduit couplings, with the conduit ends butted.
2. The use of running threads, Erickson type couplings, split couplings or similar unions are not permitted.

D. Conduit Bodies

1. Conduit bends shall meet the requirements of NEC, minimum bend radius of the cable installed or as indicated on the drawings, whichever is greater.
2. Conduits or tubing deformed or crushed in any way shall be removed from the job site.

E. Bends and Offsets

1. Changes in direction of conduits shall be made with fittings or bends.
2. Conduit bends shall meet the requirements of NEC, minimum bend radius of the cable installed or as indicated on the drawings, whichever is greater.
3. Bends shall be made using appropriate tools or mechanical equipment. The use of a pipe tee or vise for bending conduit or tubing will not be permitted.
4. For non-metallic conduit or plastic coated steel, approved factory bends and offsets shall be used.
5. Conduits or tubing deformed or crushed in any way shall be removed from the job site.
6. Install no more than the equivalent of three 90 degree bends between boxes or outlets

F. Cutting and Threading

1. The plane of all conduit ends shall be square with the centerline.
2. Where threads are required, they shall be cut and cleaned prior to conduit reaming.
3. The ends of all conduit and tubing shall be reamed to remove all rough edges and burrs.
4. Cutting oil shall be used in threading operations; the dies shall be kept sharp, and provisions shall be made for chip clearance.
5. Threads on conduits and fittings shall be lubricated with conducting and sealing compound.
6. All steel conduits shall be coated after threading with cold-galvanized zinc coating. The Contractor shall supply this protective material and shall apply it in the field prior to installing conduit or fittings.

G. All steel conduit, exposed to weather or in contact with earth, shall be re-galvanized after threading with "Galvanizing Powder M-321" as manufactured by the American Solder and Flux Company of Philadelphia, Pennsylvania; "Zincilate 810" as manufactured by Industrial Metal Protectives, Inc., of Dayton, Ohio; "Zinc Rich" coating as manufactured by ZRC Chemical Products Company, Quincy, Massachusetts; or approved equal. The Contractor shall supply this protective material and shall apply it in the field.

H. Connections to Boxes and Cabinets

1. Conduit shall be securely fastened to all boxes and cabinets.

2. Threads on metallic conduit shall project through the wall of the box to allow the bushing to butt against the end of the conduit.
 3. The locknuts, both inside and outside, shall then be tightened sufficiently to bond the conduit securely to the box.
 4. Locknuts on connectors shall be tightened securely to bond the connectors.
- I. All conduits entering enclosures outdoors or in wet areas shall enter through Meyer's hubs, or approved equal, or threaded openings.
- J. Cleaning
1. Precautions shall be taken to prevent the accumulation of water, dirt, or concrete in the conduit.
 2. Conduit in which water or other foreign materials have been permitted to accumulate shall be thoroughly cleaned or, where such accumulation cannot be removed by methods acceptable to the Owner /Engineer, the conduit shall be replaced.
 3. For conduits sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of foreign materials. For conduits less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles and foreign material.
- K. Empty Conduit
1. All conduits installed for future use shall have a polypropylene pull line with a minimum tensile strength of 200 lbs., Jet Line, Cat. No. 232, polyolefin, or approved equal. Pull line shall be secured at both ends to ensure future accessibility.
- L. Rooftop Conduits
1. Provide redwood sleepers on waterproof mastic base for all conduit runs exposed on roofs.
- M. Identification
1. All conduits shall be identified in accordance with other section of these specifications.
- N. Grounding
1. All conduits shall be grounded in accordance with specification Section 16050 – Basic Electrical Materials and Methods.
 2. A solid or stranded bare copper or green insulated copper solid or stranded ground wire shall be provided in all conduits and raceways.

O. Galvanized Rigid Steel Conduit

1. Galvanized rigid steel conduit shall be installed in areas exposed to weather, vehicle traffic, in hazardous classified areas, for penetrations through foundations, and 10 feet before transition from below grade to 8 feet above grade, unless otherwise noted on the drawings.
2. Steel conduit in contact with earth shall be protected by "Scotchwrap" 10 mil tape applied in double thickness using 50 percent lap turns to 6 inches above grade and 6 inches beyond transition.
3. Expansion joints shall be used where required.

P. Intermediate Steel Conduit

1. Intermediate steel conduit may be installed in lieu of galvanized rigid steel conduit in all above ground areas where rigid steel conduit is permitted, except for wires over 600- volts or exposed to vehicle traffic, unless otherwise specified.

Q. Polyvinyl Chloride (PVC) Coated Galvanized Rigid Steel Conduits and Intermediate Steel Conduit

1. PVC -coated, steel conduit and fittings shall be installed where highly corrosive conditions exist, indoors or outdoors.
2. The Contractor shall patch any damaged coating according to the manufacturer's instructions.

R. Electrical Metallic Tubing

1. Electrical metallic tubing shall be installed for all circuits, indoors above concrete slab, where not subject to conditions outlined for rigid galvanized steel conduits.

S. Rigid Aluminum Conduit

1. Not acceptable on this project.

T. Flexible Metal Conduit, Steel or Aluminum

1. Flexible conduit inserts not greater than 30 inches in length, shall be installed in all conduit runs, which are supported by both building steel and by structures subject to vibration or thermal expansion. This shall include locations where conduit supported by building steel enters or becomes supported by isolated structures on separate foundations.
2. Flexible conduit shall be installed in conduit runs, which cross expansion joints.
3. Special areas, such as plant office control rooms in which external noise is to be minimized, shall have flexible conduit in conduit runs where the runs cross from the main building framing to the control room or office framing.
4. Flexible conduit shall be installed adjacent to all equipment and devices, which move in relation to the supply conduit due to vibration, normal operation of the mechanism, or thermal expansion.

5. Conduit shall be connected to pressure switches, thermocouples, solenoids, and similar devices with flexible conduit. Flexible conduit shall be installed adjacent to the motor terminal housing for motors requiring 4-inch and smaller conduit.
6. Flexible metal conduit inserts not greater than 6 feet in length shall be installed for light fixture tap conductors.

U. Liquid-Tight Flexible Metal Conduit

1. Liquid-tight flexible metal conduit shall be used in place of regular flexible conduit for connections to motors and transformers, in areas exposed to weather, moisture or oil, and under raised floors.
2. Liquid-tight flexible metal conduit may be used in place of flexible metal conduit where not otherwise required.

V. Non-Metallic Conduit

1. Schedule 40 shall be used for all power, signal feeders and branch circuits, in earth or enclosed in concrete, unless otherwise noted on the drawings. Conduits must be buried in earth in accordance with the NEC.

W. Conduit Support

1. Fasten conduit supports to building structures and surfaces in accordance with Section 16050 – Basic Electrical Materials and Methods.
2. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
3. Do not use wire, ceiling support wires or perforated pipe straps to support conduit. Remove any temporary installation support wire.

X. Spacing of Supports

1. All conduit runs shall be rigidly supported, except where buried in concrete,.
2. Each conduit shall be supported within one (1) foot of junction boxes and fittings.
3. Spacers used in duct bank installations shall be placed no more than 6 to 10 feet apart.
4. Support spacing along conduit runs shall be as follows.

Conduit Size	Maximum Distance Between Supports
½ inch through 1-1/4 inch	5 feet
1-1/2 inch and larger	8 feet

- Y. Ground and bond raceway and boxes in accordance with Section 16050 – Basic Electrical Materials and Methods.

3.4 CABINET AND BOX INSTALLATION

- A. Install electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Locate boxes and conduit bodies so as to ensure ready accessibility of electrical wiring, maintain headroom and to present neat mechanical appearance.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. In inaccessible ceiling areas, install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.
- E. Use flush mounting outlet boxes in finished areas.
 - 1. Do not install flush mounting boxes back-to-back in walls.
 - 2. Provide minimum 6-inch separation between adjacent boxes.
 - 3. Provide minimum 24-inch separation in acoustic rated walls.
 - 4. Use stamped steel bridges to fasten flush mounting outlet box between studs.
 - 5. Secure flush mounting box to interior wall and partition studs.
 - 6. Accurately position to allow for surface finish thickness.
 - 7. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
 - 8. Use adjustable steel channel fasteners for hung ceiling outlet box.
- F. Support boxes independently of conduits.
- G. Use code sized gang box where more than one device is mounted together. Do not use sectional box. Use code sized gang box with plaster ring for single device outlets.
- H. Use cast outlet box in exterior locations where exposed to the weather and wet locations (interior or exterior).
- I. Coordinate installation of electrical boxes and fittings with cable and raceway installation work. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- J. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections where fastened with a locknut or bushing on rounded surface.
- K. Fasten boxes rigidly to substrate or structural surfaces to which they are being mounted, or solidly embed electrical boxes in concrete or masonry as appropriate.
- L. Except as prevented by the location of other work, all junction boxes and outlet boxes shall be centered on structures.

- M. Conduit openings in boxes shall be made with a hole saw or shall be punched.
- N. Cabinets and boxes shall be rigidly mounted.
 - 1. Mounting on concrete shall be secured by self-drilling anchors.
 - 2. Mounting on steel shall be by drilled and tapped screw holes, or by special support channels welded to the steel, or by both.
 - 3. Cabinets shall be leveled and fastened to the mounting surface with not less than ¼-inch air space between the enclosure and mounting surface.
 - 4. All mounting holes in the enclosure shall be used.
- O. Large Pull Boxes - Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 - 1. Interior Dry Locations - Use hinged enclosure.
 - 2. Other Locations - Use surface mounted box of appropriate location classification.

3.5 ANCHORS

- A. Where supports for raceways, boxes, and cabinets are mounted on concrete surfaces, they shall be fastened with self-drilling tubular expansion shell anchors with externally split expansion shells, single-cone expanders, and annular break-off grooved chucking cones. Anchors shall be Phillips "Red Head" or approved equal.

3.6 PULL BOX AND VAULT INSTALLATION

- A. Openings or "knockouts" in precast concrete vaults shall be located as shown on the drawings and shall be sized sufficiently to permit passage of the largest dimension of pipe and/or flange.
- B. Upon completion of installation, all voids or openings in the vault walls around pipes shall be filled with 3,000 psi non-shrink grout.
- C. After the structure and all appurtenances are in place and approved, backfill shall be placed to the original ground line or to the limits designated on the plans.
- D. All joints between precast concrete vault sections shall be made watertight. The plastic joint sealing compound shall be installed according to the manufacturer's recommendations to provide a watertight joint which remains impermeable throughout the design life of the structure. The outside of the entire structure shall be coated with an approved water proofing material.
- E. Access doors shall be built up such that the hatch is flush with the surrounding surface unless otherwise specified on the drawings or by the District. The Contractor is responsible for placing the cover at the proper elevation where paving is to be installed and shall make all necessary adjustments so that the cover meets these requirements.

- F. Ladders shall be installed using Type 316 stainless steel capsule anchors.
- G. Ladders shall be attached a minimum of 3 places to the vault wall.
- H. Ladder shall be centered under access door opening.

3.7 ADJUSTING

- A. Install knockout closures in unused openings in boxes.

3.8 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore manufacturer's finish.

END OF SECTION

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The extent of the electrical systems and equipment requiring identification is shown on the drawings, and the extent of identification required is specified herein and in individual sections of work requiring identification. The types of electrical identification specified in this section include the following:
 - 1. Exposed conduit color banding.
 - 2. Cable/conductor identification.
 - 3. Operational instructions and warnings.
 - 4. Equipment/system identification signs.

1.2 REFERENCES - CODES AND STANDARDS

- A. ANSI Z535.1 - Safety Color Code
- B. APWA ULCC - Uniform Color Code for Buried Utilities.
- C. NFPA 70 National Electrical Code (NEC). Latest approved edition.

1.3 SYSTEM DESCRIPTION

- A. Label the following electrical equipment with nameplates which clearly identify each item, the function or use of the item, and the circuit identification of the feed to the item:
 - 1. Distribution Panelboards, Power and Lighting Panels, Local Control Panels, Terminal Cabinets and all electrical equipment enclosure shall be identified using laminated plastic nameplates. The equipment number, voltage rating, current rating, number of phases, connection type, short circuit interrupting rating, and circuit number shall be shown
 - 2. All underground raceway or cable shall be marked with buried warning tape along its entire length.
 - 3. All exposed raceway longer than 10 feet in length shall be identified.
 - 4. Panelboard Directories: Furnish all panelboards with a complete typewritten directory mounted in the inner door under a clear plastic cover set in a metal frame.
- B. Branch circuits and devices:

1. Label all individual receptacle outlets and light switches at their faceplate to indicate the panelboard of origin and branch circuit number, as shown on drawings. Label modular furniture feeds at the power pole drop in a visible and consistent location. Labels shall be self adhesive, thermal machine printed type such as Brothers, Panduit, or T&B and shall be clear plastic with black lettering.
2. All branch circuits in outlet boxes shall be identified with circuit number using wrap-around labels (T&B, BRADY or 3M).
3. As an alternative to separate nameplates, device plates may be engraved directly with lettering filled with black enamel.

1.4 SUBMITTALS

- A. Catalog data for nameplates, labels, and markers.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 – National Electrical Code.
- B. Furnish products listed and classified by Underwriters' Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, approved testing and listing agencies as suitable for the purpose specified and shown.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. Nameplates
 1. Engraved three-layer laminated plastic, white letters on black background for normal power and white letters on red background for emergency power. Communications and control cabinets shall be labeled with white letters on green background.
 2. Locations
 - a. Each electrical distribution and control equipment enclosure.
 - b. Communication cabinets.
 3. Letter Size

- a. Use 1/8-inch letters for identifying individual equipment and loads.
- b. Use 1/4-inch letters for identifying grouped equipment, loads, panelboards, and transfer switches.
- c. Use 1/2-inch letters for identifying the main switchboard, motor control centers, transformers and large distribution switchboards.

B. Labels

- 1. Embossed adhesive tape, with 3/16-inch white letters on colored background to match color scheme of plastic laminate labels in 2.1.1. Use only for identification of individual wall switches and receptacles, control device stations, and multi-outlet devices.
- 2. Thickness
 - a. 1/16-inch for units up to 20 square inches or 8-inch length; 1/8-inch for larger units.

2.2 WIRE MARKERS

A. Manufacturers

- 1. Brady
- 2. Thomas & Betts
- 3. 3-M Co.

B. Description: Cloth, tape, split sleeve, or tubing type wire markers, self-adhesive.

C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, control panels, motor controllers and starters, and each load connection.

D. Legend

- 1. Power and Lighting Circuits: Branch circuit or feeder feed from.
- 2. Control Circuits: Control wire number indicated on shop drawings.
- 3. Neutral Conductors: Clearly indicate the branch circuit or feeder number the neutral serves. In multi-wire circuits where the neutral is shared, mark the neutral with the circuit number of the "A" phase.

2.3 CONDUIT MARKERS

- A. Provide manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, minimum of 3 mils thick and 1-1/2-inch wide extending 360 degrees around conduits; designed for self-adhesive attachment to conduit. Except as otherwise indicated, provide lettering that indicates the voltage of the conductor(s) in the conduit. Provide 8-inch minimum length for 2-inch and smaller conduit, 12-inch minimum length for larger conduit.

- B. Location: Furnish markers for each conduit longer than 10 feet.
- C. Spacing: 20 feet on center.
- D. Color: Unless otherwise indicated or required by governing regulation, provide orange markers with black letters.
 - 1. Fire Alarm System: Red w/black letters.
 - 2. Telephone System: Green w/yellow letters.
 - 3. Data/Communication. System: White w/black letters.
- E. Legend:
 - 1. 208 Volt System: Normal 208/120-volts.
 - 2. Fire Alarm System: Fire alarm.
 - 3. Telephone System: Telephone.
 - 4. Data/Communication System: Data/communications.

2.4 FASTENERS

- A. Secure all labels and nameplates with self-tapping stainless steel screws. Use contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5 LETTERING AND GRAPHICS

- A. Coordinate names, abbreviations and other designations used in the electrical identification work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

2.6 UNDERGROUND WARNING TAPE

- A. Three-inch minimum width, 5 mil thickness, foil bonded polyethylene tape, detectable type, with suitable continuous warning legend describing buried electrical lines. Tape color shall conform to APWA uniform color code using ANSI Z535.1 safety colors. Text shall be black, 2-inch minimum letters.
- B. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.
- B. Coordination: Where identification is to be applied to surfaces that require finish, install identification after completion of painting.
- C. Regulations: Comply with governing regulations and the requests of governing authorities for the identification of electrical work.

3.2 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws, rivets, or adhesive.
- C. Secure nameplate to outside moveable surface of door on panelboard.
- D. Conduit Identification:
 - 1. Where electrical conduit is exposed in spaces with exposed mechanical piping, which is identified by a color-coded method, apply color-coded identification on the electrical conduit in a manner similar to the piping identification. Except as otherwise indicated, use orange as the coded color for conduit.
 - 2. Paint red band or provide red tape on each fire alarm conduit longer than 10 feet, minimum 20 feet on center.
- E. Cable/Conductor Identification:
 - 1. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where the wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided.
 - 2. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.
- F. Operational Identification and Warnings
 - 1. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems, and electrically connected mechanical systems and general systems and equipment, including the prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed

instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes.

G. Equipment/System Identification Signs

1. Install an engraved plastic-laminate sign on each major unit of electrical equipment in the building; including the central or master unit of each electrical system and the communication/signal systems, unless the unit is specified with its own self-explanatory identification or signal system.
2. Except as otherwise indicated or specified, provide single line of text, 1/2-inch high lettering on 1-1/2-inch high sign (2-inch high where two lines are required), white lettering in black field.
3. Provide text matching terminology and numbering of the contract documents and shop drawings.

- H. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrata with fasteners, except use adhesive where fasteners should not or cannot penetrate the substrata.

END OF SECTION

SECTION 262413

SWITCHBOARDS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Service and distribution switchboards rated 600 V and less.
 - 2. Surge protection devices.
 - 3. Disconnecting and overcurrent protective devices.
 - 4. Instrumentation.
 - 5. Accessory components and features.
 - 6. Identification.

1.3 ACTION SUBMITTALS

- A. Product Data: For each switchboard, overcurrent protective device, surge protection device, ground-fault protector, accessory, and component.
 - 1. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- B. Shop Drawings: For each switchboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
 - 5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
 - 6. Detail utility company's metering provisions with indication of approval by utility company.
 - 7. Include evidence of NRTL listing for series rating of installed devices.
 - 8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

- C. Samples: Representative portion of mimic bus with specified material and finish, for color selection.
- D. Delegated Design Submittal:
 - 1. For arc-flash hazard analysis.
 - 2. For arc-flash labels.

1.4 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for switchboards, overcurrent protective devices, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 2.1 and trained in electrical safety as required by NFPA 70E.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
- B. Handle and prepare switchboards for installation according to **NEMA PB 2.1**.

1.7 FIELD CONDITIONS

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.
- B. Environmental Limitations:
 - 1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding **115 deg F**.
 - b. Altitude: Not exceeding **6600 feet**.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify County of Mendocino Facilities Department no fewer than **seven** days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without County of Mendocino Facilities Department written permission.
 - 4. Comply with NFPA 70E.

1.8 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace switchboard enclosures, buswork, overcurrent protective devices, accessories, and factory installed interconnection wiring that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Three** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. Shake-table testing shall comply with ICC-ES AC156.
 2. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified **and the unit will be fully operational after the seismic event.**"

2.2 SWITCHBOARDS

- A. Eaton/Cutler Hammer; Square D, Siemens
- B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. 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.
- E. Comply with NEMA PB 2.
- F. Comply with NFPA 70.
- G. Comply with UL 891.
- H. Front-Connected, Front-Accessible Switchboards:
 1. Main Devices: Fixed, individually mounted.
 2. Branch Devices: Panel mounted.
 3. Sections front and rear aligned.
- I. Nominal System Voltage: **208Y/120 V**.
- J. Main-Bus Continuous: **1200A and 800A as indicated**.

- K. Seismic Requirements: Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. Shake-table testing shall comply with ICC-ES AC156.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- L. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's [**standard gray**] [**custom color**] finish over a rust-inhibiting primer on treated metal surface.
- M. Outdoor Enclosures: **Type 3R**.
1. Finish: Factory-applied finish in manufacturer's **standard** color; undersurfaces treated with corrosion-resistant undercoating.
 2. Enclosure: **Flat** roof; **bolt-on rear covers and lockable** doors to allow access to circuit breaker, metering, accessory, and blank compartments.
- N. Insulation and isolation for **main bus of main device** and vertical buses of feeder sections.
- O. Service Entrance Rating: Switchboards intended for use as service entrance equipment shall contain from one to six service disconnecting means with overcurrent protection, a neutral bus with disconnecting link, a grounding electrode conductor terminal, and a main bonding jumper.
- P. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.
- Q. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- R. Buses and Connections: Three phase, four wire unless otherwise indicated.
1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from the front of the switchboard.

2. Phase- and Neutral-Bus Material: Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
 3. Copper feeder circuit-breaker line connections.
 4. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with **mechanical** connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
 5. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical compression connectors for feeder and branch-circuit ground conductors.
 6. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
 7. Disconnect Links:
 - a. Isolate neutral bus from incoming neutral conductors.
 - b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.
 8. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
 9. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.
- S. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.
- T. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
 4. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 5. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.

- b. Lugs: **Mechanical** style, suitable for number, size, trip ratings, and conductor material.

2.4 INSTRUMENTATION

- A. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
 - 1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
 - a. Phase Currents, Each Phase: Plus or minus 0.5 percent.
 - b. Phase-to-Phase Voltages, Three Phase: Plus or minus 0.5 percent.
 - c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 0.5 percent.
 - d. Megawatts: Plus or minus 1 percent.
 - e. Megavars: Plus or minus 1 percent.
 - f. Power Factor: Plus or minus 1 percent.
 - g. Frequency: Plus or minus 0.1 percent.
 - h. Accumulated Energy, Megawatt Hours: Plus or minus 1 percent; accumulated values unaffected by power outages up to 72 hours.
 - i. Megawatt Demand: Plus or minus 1 percent; demand interval programmable from five to 60 minutes.
 - j. Contact devices to operate remote impulse-totalizing demand meter.
 - 2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.
- B. Watt-Hour Meters and Wattmeters:
 - 1. Provisions per the Utility Company.
- C. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store switchboards according to **NEMA PB 2.1**.
 - 1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's instructions.
 - 2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
 - 3. Protect from moisture, dust, dirt, and debris during storage and installation.

4. Install temporary heating during storage per manufacturer's instructions.
- B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect the performance of the equipment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install switchboards and accessories according to **NEMA PB 2.1**.
- B. Equipment Mounting: Install switchboards on concrete base as indicated on the Contract Drawings.
 1. Install conduits entering underneath the switchboard, entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend **2 inches (50-mm)** above concrete base after switchboard is anchored in place.
- C. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
- D. Install filler plates in unused spaces of panel-mounted sections.
- E. Install overcurrent protective devices, surge protection devices, and instrumentation.
 1. Set field-adjustable switches and circuit-breaker trip ranges.
- F. Install spare-fuse cabinet.
- G. Comply with NECA 1.

3.3 CONNECTIONS

- A. Comply with requirements for terminating feeder bus specified in Section 262500 "Enclosed Bus Assemblies." Drawings indicate general arrangement of bus, fittings, and specialties.
- B. Comply with requirements for terminating cable trays specified in Section 260536 "Cable Trays for Electrical Systems." Drawings indicate general arrangement of cable trays, fittings, and specialties.

- C. Bond conduits entering underneath the switchboard to the equipment ground bus with a bonding conductor sized per NFPA 70.
- D. Support and secure conductors within the switchboard according to NFPA 70.
- E. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.4 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Acceptance Testing:
 - a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
 - b. Test continuity of each circuit.
 - 2. Test ground-fault protection of equipment for service equipment per NFPA 70.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 5. Perform the following infrared scan tests and inspections, and prepare reports:

- a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove **[front]** **[front and rear]** panels so joints and connections are accessible to portable scanner.
- C. Switchboard will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262413

SECTION 262416

600-VOLT RATED PANELBOARDS & CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution and branch circuit panelboards and circuit breakers.

1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260526: Grounding and Bonding for Electrical Systems
- C. Section 260553: Identification for Electrical Systems

1.3 REFERENCES - CODES AND STANDARDS

- A. ANSI C2 National Electrical Safety Code.
- B. NECA Standard of Installation
- C. NEMA AB 1 Molded Case Circuit Breakers.
- D. NEMA ICS 6 Enclosures
- E. NEMA PB 1 Panelboards.
- F. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NETA ATS (National Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
- H. NFPA 70 National Electrical Code

1.4 SUBMITTALS

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Product Data: Submit catalog data showing specified features of standard products.

C. Test Report:

1. Factory Tests:

- a. Certified factory test reports shall be submitted for manufacturer performed routine factory tests, including tests required by standards listed in paragraph "References". Results of factory tests performed shall be certified by the manufacturer, or an approved testing laboratory, and submitted within 7 days following successful completion of the tests. The manufacturer's pass-fail criteria for tests specified in paragraph "Field Testing" shall be included.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years experience.

1.7 MAINTENANCE MATERIALS

- A. Furnish two (2) of each panel board key. Panelboards keyed alike to Owner's current keying system.

PART 2 - PRODUCTS

2.1 DISTRIBUTION AND BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
 1. Cutler Hammer
 2. Siemens.
 3. Square D Co.
- B. Product Description

1. NEMA PB 1, circuit breaker type distribution, lighting and appliance branch circuit panelboard.
- C. Service Conditions:
1. Temperature: 104 degrees F (40 degrees C) ambient
 2. Altitude: 100 feet (35 m) above sea level.
- D. Panelboard Bus
1. Silver plated copper current carrying components, ratings as indicated on drawings.
 2. Main bus ampacity shall be equal to the main circuit breaker frame size rating.
 3. Furnish copper ground bus in each panelboard.
- E. Minimum integrated short circuit rating
1. Panelboards rated 240-Volts - 10,000 amperes RMS symmetrical
 2. Panelboards rated 480-Volts - 42,000 amperes RMS symmetrical
 3. Circuit Breaker rating shall match or exceed the panel interrupting rating
 4. Series rated circuit breakers are not acceptable
- F. Enclosure:
1. Indoor Installation:
 - a. NEMA PB 1, Type 1, gasketed, steel construction, minimum 6 inches (153 mm) deep, 20 (503 mm) inches wide suitable for flush or surface mounting as indicated on drawings.
 - b. Flush or surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.
 - c. Fully hinged door with flush lock and metal directory frame.
 - d. Finished in manufacturer's standard gray enamel (ANSI 61).
 2. Outdoor Installation:
 - a. Panel shall be housed inside an outer weatherproof, corrosion resistant, NEMA 4X, 316 stainless steel enclosure constructed as follows:
 - b. Steel support frame with body stiffeners for added strength and minimum 12 gauge 316 stainless steel panels all around.
 - c. Steel panels shall have seams that are continuously welded and ground smooth with no holes or knockouts.
 - d. The outer door shall provide two-door protection, isolation of electrical equipment and easy access to the interior section doors and devices.
 - e. Provide rolled lip around three sides of each outer door and along the top of enclosure opening to channel away liquids and contaminants.

- f. Provide oil-resistant door gasket attached with oil resistant adhesive and held in place with steel retaining strips.
- g. Provide heavy gauge steel continuous piano hinged, 3-point latch, hasp and staple for pad-locking.
- h. Provide continuous external support channels for floor mounting, leveling and anchoring the assembly.
- i. Provide heavy duty removable lifting angles and/or lugs.
- j. Provide suitable grounding stud on door and body.
- k. Provide adequate cable entry space and conduit fittings approved for NEMA Type 4X enclosure for top or bottom conduit entry as indicated on the drawings.
- l. Provide space heaters with thermostat control in each section to prevent condensation.

2.2 MOLDED CASE CIRCUIT BREAKERS

- A. NEMA AB 1, bolt-on type thermal magnetic and instantaneous magnetic trip circuit breaker. Circuit breaker thermal elements shall be of the bimetallic type and shall be capable of withstanding sustained overload and short-circuit currents without injury and without affecting the calibration of the bimetallic element. The thermal element shall have inverse time characteristics. The instantaneous elements shall trip the circuit breaker at the minimum standard trip setting.
- B. Provide common trip handle for multiple pole circuit breakers.
- C. Provide type SWD for lighting circuits and type HACR circuit breakers for air conditioning equipment circuits.
- D. Provide Class A ground fault interrupter circuit breakers as indicated on drawings.
- E. Trip rating shall be as indicated on drawings.
- F. Minimum integrated short circuit rating
 - 1. Circuit Breakers rated 240-Volts - 10,000 amperes RMS symmetrical
 - 2. Circuit Breakers rated 480-Volts - 42,000 amperes RMS symmetrical
 - 3. Circuit Breaker rating shall match or exceed the panel interrupting rating
 - 4. Series rated breakers are not acceptable

PART 3 - EXECUTION

3.1 EXISTING WORK

- A. Disconnect and remove abandoned panelboards. Verify all branch circuits are no longer in use before disconnecting.

- B. Maintain access to existing panelboard that remain active and require access. Modify installation or provide access panel.
- C. Clean and repair existing panelboards to remain or to be reinstalled.

3.2 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA "Standard of Installation", NFPA 70 and IEEE C2.
- B. Install panelboards plumb.
- C. Install recessed panelboards flush with wall finishes.
- D. Mounting height: 6 feet (1,800 mm) to top of panelboard. Install panelboards taller than 6 feet (1,800 mm) with bottom no more than 4 inches (100 mm) above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each panelboard. Revise directory to reflect circuiting changes to balance phase loads.
- G. Install engraved plastic nameplates in accordance with Section 260553.
- H. Ground and bond panelboard enclosure according to Section 260526. Connect equipment ground bars of panels in accordance with NEC.

3.3 FIELD QUALITY CONTROL

- A. Field Inspect and testing shall be in performer under the provisions of NETA ATS 7.6 (1) (1) – Circuit Breaker, Low Voltage, Insulated Case/Molded Case, as outlined below:
 - 1. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect circuit breaker for correct mounting.
 - d. Operate circuit breaker to insure smooth operation.
 - e. Inspect case for cracks or other defects.
 - f. Verify appropriate anchorage, required area clearances, physical damage, and correct alignment.
 - g. Inspect all doors, panels, and sections for corrosion, dents, scratches, fit, and missing hardware.
 - h. Verify that fuse and/or circuit breaker sizes and types correspond to drawings.
 - i. Perform circuit breaker inspections and operation test.

3.4 ADJUSTING

- A. Rearrange circuits in panelboard to balance phase loads to within 20 percent of each other.
- B. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 263213 - DIESEL ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. Section includes OWNER FURNISHED, CONTRACTOR INSTALLED packaged engine generators used to supply emergency power, with the following features:
 - 1. Diesel engine.
 - 2. Diesel fuel-oil system.
 - 3. Control and monitoring.
 - 4. Generator overcurrent and fault protection.
 - 5. Generator, exciter, and voltage regulator.
 - 6. Outdoor engine generator enclosure.
 - 7. Vibration isolation devices.
 - 8. Finishes.
- B. Related Requirements:
 - 1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

- A. 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.

1.4 ACTION SUBMITTALS – BY OWNER

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 2. Include thermal damage curve for generator.
 - 3. Include time-current characteristic curves for generator protective device.
 - 4. Include fuel consumption in gallons per hour (liters per hour) at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
 - 5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.

6. Include airflow requirements for cooling and combustion air in cubic feet per minute (cubic meters per minute) at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F (35, 27, 21, and 10 deg C). Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS – BY OWNER

- A. Seismic Qualification Data: Certificates, for engine generator, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: With engine and generator mounted on rails, identify center of gravity and total weight, including full fuel tank, supplied enclosure, external silencer, subbase-mounted fuel tank, and each piece of equipment not integral to the engine generator, and locate and describe mounting and anchorage provisions.
 3. Coordinate "Source Quality-Control Reports" Paragraph below with "Source Quality Control" Article.
- B. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
1. Provide "Operation and Maintenance Data," include the following:

- a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
- b. Operating instructions laminated and mounted adjacent to generator location.
- c. Training plan.

1.7 MAINTENANCE MATERIAL SUBMITTALS – BY OWNER

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 - 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 - 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 - 4. Tools: Each tool listed by part number in operations and maintenance manual.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: **5** years from date of Substantial Completion.

PART 2 - PRODUCTS – BY OWNER

2.1 MANUFACTURERS

- A. **Kohler, Caterpillar, or Cummins.**
- B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.
- C. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.

- D. UL Compliance: Comply with UL 2200.
- E. Engine Exhaust Emissions: Comply with EPA Tier 4 requirements and applicable state and local government requirements.
- F. Noise Emission: Comply with applicable state and local government requirements due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- G. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C).
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to **1000 feet** .

2.2 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- 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 use.
- C. Power Rating: **Prime**.
- D. Overload Capacity: 110 percent of service load for 1 hour in 12 consecutive hours.
- E. Service Load: **230kW/288KvA**.
- F. Power Factor: **0.8** lagging.
- G. Frequency: 60 Hz.
- H. Voltage: **208** -V ac.
- I. Phase: Three-phase, **four** wire, **wye**.
- J. Induction Method: **Naturally aspirated**.
- K. Governor: Adjustable isochronous, with speed sensing.
- L. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.
- M. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated excluding power required for the continued and repeated operation of the unit and auxiliaries.
2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

N. Engine Generator Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: **10** seconds.

2.3 DIESEL ENGINE

- A. Fuel: ASTM D975, diesel fuel oil, Grade 2-D S15.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be 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, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499.
- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.
 - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Cooling System: Closed loop, liquid cooled, with remote radiator and **integral engine driven** coolant pump.
1. Configuration: **Vertical** air discharge.
 2. Radiator Core Tubes: **Aluminum**.
 3. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 5. Fan: Driven by **multiple belts from engine shaft**.
 6. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 7. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- G. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
- H. Muffler/Silencer: Commercial type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Minimum sound attenuation of 12 dB at 500 Hz.
 2. Sound level measured at a distance of 25 feet (8 m) from exhaust discharge after installation is complete shall be **90** dBA or less.
- I. Air-Intake Filter: **Heavy**-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- J. Starting System: **12**-V electric, with negative ground.

1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: 60 seconds.
4. Battery: **lead-acid**, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least **three times** without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F (10 deg C) regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for **lead-acid** batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F (minus 40 to plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close 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.

2.4 DIESEL FUEL-OIL SYSTEM

- A. Comply with NFPA 30.
- B. Piping: Fuel-oil piping shall be Schedule 40 black steel. Aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.

- C. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.
- D. Fuel Filtering: Remove water and contaminants larger than 1 micron.
- E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- F. Subbase-Mounted, Double-Wall, Fuel-Oil Tank: Factory installed and piped, complying with UL 142 fuel-oil tank. Features include the following:
 - 1. Tank level indicator.
 - 2. Fuel-Tank Capacity: Minimum 133 percent of total fuel required for planned operation plus fuel for periodic maintenance operations between fuel refills.
 - 3. Leak detection in interstitial space.
 - 4. Vandal-resistant fill cap.
 - 5. Containment Provisions: Comply with requirements of authorities having jurisdiction.

2.5 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- C. Provide minimum run time control set for **15** minutes with override only by operation of a remote emergency-stop switch.
- D. Comply with UL 508A.
- E. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.
- F. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel. Panel shall be powered from the engine generator battery.
- G. Configuration: Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Control and

monitoring section of panel shall be isolated from power sections by steel barriers. Panel shall be powered from the engine generator battery. Panel features shall include the following:

1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6.
2. Switchboard Construction: Freestanding unit complying with Section 262413 "Switchboards." Power bus shall be copper. Bus, bus supports, control wiring, and temperature rise shall comply with UL 891.
3. Switchgear Construction: Freestanding unit complying with Section 262300 "Low-Voltage Switchgear."

H. Control and Monitoring Panel:

1. Digital engine generator controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
2. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
3. Instruments: Located on the control and monitoring panel and viewable during operation.
 - a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter, **connected to a phase selector switch.**
 - f. AC ammeter, **connected to a phase selector switch.**
 - g. AC frequency meter.
 - h. Generator-voltage adjusting rheostat.
4. Controls and Protective Devices: Controls, shutdown devices, and common alarm indication, including the following:
 - a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank alarm.
 - e. Overcrank shutdown device.
 - f. Low-water temperature alarm.
 - g. High engine temperature pre-alarm.
 - h. High engine temperature.
 - i. High engine temperature shutdown device.
 - j. Overspeed alarm.
 - k. Overspeed shutdown device.
 - l. Low fuel main tank.
 - 1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for duration required in "Fuel Tank Capacity" Subparagraph in "Diesel Fuel-Oil System" Article.
 - m. Coolant low-level alarm.
 - n. Coolant low-level shutdown device.

- o. Coolant high-temperature prealarm.
 - p. Coolant high-temperature alarm.
 - q. Coolant low-temperature alarm.
 - r. Coolant high-temperature shutdown device.
 - s. Battery high-voltage alarm.
 - t. Low cranking voltage alarm.
 - u. Battery-charger malfunction alarm.
 - v. Battery low-voltage alarm.
 - w. Lamp test.
 - x. Contacts for local and remote common alarm.
 - y. Low-starting air pressure alarm.
 - z. Low-starting hydraulic pressure alarm.
 - aa. Remote manual stop shutdown device.
 - bb. Air shutdown damper alarm when used.
 - cc. Air shutdown damper shutdown device when used.
 - dd. Generator overcurrent-protective-device not-closed alarm.
 - ee. Hours of operation.
 - ff. Engine generator metering, including voltage, current, hertz, kilowatt, kilovolt ampere, and power factor.
- I. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.
- J. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
- 1. Overcrank alarm.
 - 2. Low water-temperature alarm.
 - 3. High engine temperature pre-alarm.
 - 4. High engine temperature alarm.
 - 5. Low lube oil pressure alarm.
 - 6. Overspeed alarm.
 - 7. Low fuel main tank alarm.
 - 8. Low coolant level alarm.
 - 9. Low cranking voltage alarm.
 - 10. Contacts for local and remote common alarm.
 - 11. Audible-alarm silencing switch.
 - 12. Air shutdown damper when used.
 - 13. Run-Off-Auto switch.
 - 14. Control switch not in automatic position alarm.
 - 15. Fuel tank derangement alarm.
 - 16. Fuel tank high-level shutdown of fuel supply alarm.
 - 17. Lamp test.
 - 18. Generator overcurrent-protective-device not-closed alarm.

- K. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.
- L. Remote Emergency-Stop Switch: Flush; wall mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices shall be coordinated to optimize selective tripping when a short circuit occurs.
- B. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489.
 - 1. Tripping Characteristic: Designed specifically for generator protection.
 - 2. Trip Rating: Matched to generator output rating.
 - 3. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
 - 4. Mounting: Adjacent to, or integrated with, control and monitoring panel.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: **Class H**.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide **six**-lead alternator.
- E. Range: Provide **limited** range of output voltage by adjusting the excitation level.
- F. Construction shall prevent 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.
- G. Enclosure: weatherproof.
- H. Instrument Transformers: Mounted within generator enclosure.
- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within **15** percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within **5** percent and stabilize at rated frequency within **2** seconds.

- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

2.8 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
 - 1. Sound Attenuation Level: 75db.
- B. Description: Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.
- C. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100 mph (160 km/h).
- D. Seismic Design: Comply with seismic requirements in Section 260548.16 "Seismic Controls for Electrical Systems."
- E. Hinged Doors: With padlocking provisions.
- F. Space Heater: Thermostatically controlled and sized to prevent condensation.
- G. Lighting: Provide weather-resistant **LED** lighting with **30 fc (330 lx)** average maintained.
- H. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- I. Muffler Location: **External to** enclosure.
- J. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
 - 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Stormproof and drainable louvers prevent entry of rain and snow.
 - 2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
 - 3. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.
- K. Interior Lights with Switch: Factory-wired, vaporproof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
 - 1. AC lighting system and connection point for operation when remote source is available.
 - 2. DC lighting system for operation when remote source and generator are both unavailable.

- L. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.

2.9 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material: **Standard neoprene.**
- B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.10 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL – COORDINATE WITH EQUIPMENT SUPPLIER

- A. Manufacturer's Field Service: Factory-authorized service representative shall test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with Drawings and the Specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify that the unit is clean.
 - b. Electrical and Mechanical Tests:
 - 1) Perform insulation-resistance tests according to IEEE 43.
 - a) Machines 200 hp (150 kW) or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
 - 2) Test protective relay devices.

- 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
 - 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 5) Perform vibration test for each main bearing cap.
 - 6) Verify correct functioning of the governor and regulator.
2. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 3. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 4. 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.
 5. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 6. Exhaust Emissions Test: Comply with applicable government test criteria.
 7. 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.
 8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 9. Noise Level Tests: Measure A-weighted level of noise emanating from engine generator installation, including engine exhaust and cooling-air intake and discharge, at **four** locations **on the property line**, and compare measured levels with required values.
- D. Coordinate tests with tests for transfer switches and run them concurrently.
 - E. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
 - F. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
 - G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
 - H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- 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.

3.2 MAINTENANCE SERVICE – BY OWNER

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include **12** months' full maintenance by skilled employees of manufacturer's authorized service representative. Include quarterly preventive maintenance and exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Parts shall be manufacturer's authorized replacement parts and supplies.

3.3 DEMONSTRATION

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

END OF SECTION 263213.14

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. Section includes OWNER FURNISHED, CONTRACTOR INSTALLED automatic transfer switch rated 600 V and less, including the following:
 - 1. Remote annunciator system.

1.3 ACTION SUBMITTALS – BY OWNER

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
 - 2. Include material lists for each switch specified.
 - 3. Single-Line Diagram: Show connections between transfer switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
 - 4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.4 INFORMATIONAL SUBMITTALS – BY OWNER

- A. Seismic Qualification Data: Certificates, for transfer switches, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

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

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

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

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Features and operating sequences, both automatic and manual.
 - b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications:

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

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Time equal to the Generator set.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NEMA ICS 1.
- C. Comply with NFPA 99.
- D. Comply with NFPA 110.
- E. Comply with UL 1008 unless requirements of these Specifications are stricter.
- F. 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.
- G. Tested Fault-Current Closing and Short-Circuit 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.
 - 2. Short-time withstand capability for **three** cycles.
- H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
- K. Service-Rated Transfer Switch:
 - 1. Comply with UL 869A and UL 489.
 - 2. Provide terminals for bonding the grounding electrode conductor to the grounded service conductor.
 - 3. In systems with a neutral, the bonding connection shall be on the neutral bus.
 - 4. Provide removable link for temporary separation of the service and load grounded conductors.
 - 5. Surge Protective Device: Service rated.
 - 6. Ground-Fault Protection: Comply with UL 1008 for **normal bus**.
 - 7. Service Disconnecting Means: Externally operated, manual **mechanically** actuated.
- L. Neutral Switching: See Contract Documents single line diagram.

- M. Neutral Terminal: Solid and fully rated unless otherwise indicated.
- N. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.
- O. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- P. Battery Charger: For generator starting batteries.
 - 1. Float type, rated **2 A**.
 - 2. Ammeter to display charging current.
 - 3. Fused ac inputs and dc outputs.
- Q. 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.
- R. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable **shrinkable sleeve** markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "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.
 - 4. Accessible via **front** access.
- S. Enclosures: General-purpose NEMA 250, as noted on the drawings, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 MOLDED-CASE-TYPE AUTOMATIC TRANSFER SWITCHES – BY OWNER

- A. Match generator.
- B. Comply with Level 1 equipment according to NFPA 110.
- C. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using contactor-based components are unacceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.
 - 3. Contacts: Silver composition or silver alloy for load-current switching.

4. Conductor Connectors: Suitable for use with conductor material and sizes.
 5. Material: **Tin-plated aluminum.**
 6. Main and Neutral Lugs: **Compression** type.
 7. Ground Lugs and Bus-Configured Terminators: **Compression** type.
 8. Ground bar.
 9. Connectors shall be marked for conductor size and type according to UL 1008.
- D. Automatic Delayed-Transition Transfer Switches: Pauses or stops in intermediate position to momentarily disconnect both sources, with transition controlled by programming in the automatic transfer-switch controller. Interlocked to prevent the load from being closed on both sources at the same time.
1. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals for alternative source. Adjustable from zero to six seconds, and factory set for one second.
 2. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.
 3. Fully automatic break-before-make operation with center off position.
 4. Fully automatic break-before-make operation with transfer when two sources have near zero phase difference.
- E. Automatic Transfer-Switch Controller Features:
1. Controller operates through a period of loss of control power.
 2. 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 shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 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 zero to 30 minutes, and factory set for 10 minutes. Override shall 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 shall be adjustable from 10 to 30 minutes. Factory settings shall be 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 unavailable.

F. Remote Annunciator System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches.
3. Annunciation panel display shall include the following indicators:
 - a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - b. Switch position.
 - c. Switch in test mode.
 - d. Failure of communication link.
4. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
 - a. Indicating Lights: Grouped for each transfer switch monitored.
 - b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
 - c. Mounting: Flush, modular, steel cabinet unless otherwise indicated.
 - d. Lamp Test: Push-to-test or lamp-test switch on front panel.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. 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.
- B. Prepare test and inspection reports.
 - 1. For each of the tests required by UL 1008, performed on representative devices, for **emergency** systems. Include results of test for the following conditions:
 - a. Overvoltage.
 - b. Undervoltage.
 - c. Loss of supply voltage.
 - d. Reduction of supply voltage.
 - e. Alternative supply voltage or frequency is at minimum acceptable values.
 - f. Temperature rise.
 - g. Dielectric voltage-withstand; before and after short-circuit test.
 - h. Overload.
 - i. Contact opening.
 - j. Endurance.
 - k. Short circuit.
 - l. Short-time current capability.
 - m. Receptacle withstand capability.
 - n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Floor-Mounting Switch: Anchor to floor by bolting.
 - 1. Install transfer switches on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 3. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
 - 4. Provide workspace and clearances required by NFPA 70.
- B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.
- C. Identify components according to Section 260553 "Identification for Electrical Systems."

- D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- E. Comply with NECA 1.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.
 - 1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- F. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."
- G. Connect twisted pair cable according to Section 271513 "Communications Copper Horizontal Cabling."
- H. Brace and support equipment according to Section 260548.16 "Seismic Controls for Electrical Systems."
- I. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches (457 mm) in length.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Factory-authorized service representative shall test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections:
 - 1. After installing equipment, test for compliance with requirements according to NETA ATS.
 - 2. Visual and Mechanical Inspection:

- a. Compare equipment nameplate data with Drawings and Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and required clearances.
 - d. Verify that the unit is clean.
 - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - f. Verify that manual transfer warnings are attached and visible.
 - g. Verify tightness of all control connections.
 - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
 - 1) Use of low-resistance ohmmeter.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
 - i. Perform manual transfer operation.
 - j. Verify positive mechanical interlocking between normal and alternate sources.
 - k. Perform visual and mechanical inspection of surge arresters.
 - l. Inspect control power transformers.
 - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
 - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
 - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
3. Electrical Tests:
- a. Perform insulation-resistance tests on all control wiring with respect to ground.
 - b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
 - c. Verify settings and operation of control devices.
 - d. Calibrate and set all relays and timers.
 - e. Verify phase rotation, phasing, and synchronized operation.
 - f. Perform automatic transfer tests.
 - g. Verify correct operation and timing of the following functions:
 - 1) Normal source voltage-sensing and frequency-sensing relays.
 - 2) Engine start sequence.
 - 3) Time delay on transfer.
 - 4) Alternative source voltage-sensing and frequency-sensing relays.
 - 5) Automatic transfer operation.

- 6) Interlocks and limit switch function.
 - 7) Time delay and retransfer on normal power restoration.
 - 8) Engine cool-down and shutdown feature.
- 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, perform each electrical test for transfer switches stated in NETA ATS and 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 retransfer from 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. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
 - f. 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. Coordinate tests with tests of generator and run them concurrently.
- D. 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.
- E. Transfer switches will be considered defective if they do not pass tests and inspections.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Prepare test and inspection reports.

3.4 DEMONSTRATION – BY OWNER

- A. **Train** Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
- B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.
- C. Coordinate this training with that for generator equipment.

END OF SECTION 263600

SECTION 323113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Chain-link fences.
 - 2. Swing gates.
 - 3. Privacy slats.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Gates and hardware.
- B. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:
 - 1. Polymer-Coated Components: In 6-inch (150-mm) lengths for components and on full-sized units for accessories.

1.4 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
1. Fabric Height: as noted.
 2. Steel Wire for Fabric: Wire diameter of 0.148 inch (3.76 mm).
 - a. Mesh Size: 1-3/4 inches (44 mm).
 - b. Zinc-Coated Fabric: ASTM A392, Type II, Class 1, 1.2 oz./sq. ft. (366 g/sq. m) with zinc coating applied afterweaving.
 - c. Polymer-Coated Fabric: ASTM F668, Class 2a over zinc-coated steel wire.
 - 1) Color: Brown, according to ASTM F934.
 3. Selvage: Knuckled top and bottom.

2.2 FENCE FRAMEWORK

- A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F1043 based on the following:
1. Fence Height: match existing
 2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe.
 - a. Line Post: 2.375 inches (60 mm) in diameter.
 - b. End, Corner, and Pull Posts: 2.875 inches (73 mm).
 3. Horizontal Framework Members: Intermediate top and bottom rails according to ASTM F1043.
 - a. Top Rail: 1.66 inches (42 mm) in diameter.
 4. Brace Rails: ASTM F1043.
 5. Metallic Coating for Steel Framework:
 - a. Type A: Not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating according to ASTM A123/A123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating according to ASTM A653/A653M.
 6. Polymer coating over metallic coating.

- a. Color: Brown, according to ASTM F934.

2.3 SWING GATES

- A. General: ASTM F900 for gate posts and single swing gate types.
 - 1. Gate Leaf Width: 48 inches.
 - 2. Framework Member Sizes and Strength: Based on gate fabric height 96 inches.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; protective coating and finish to match fence framework.
 - 2. Gate Posts: Round tubular steel.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded or assembled with corner fittings.
- D. Hardware:
 - 1. Hinges: 180-degree outward swing.
 - 2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.4 FITTINGS

- A. Provide fittings according to ASTM F626.
- B. Rail and Brace Ends: For each gate, corner, pull, and end post.
- C. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches (152 mm) long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails to posts.
- D. Tension and Brace Bands: Pressed steel.
- E. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- F. Tie Wires, Clips, and Fasteners: According to ASTM F626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:

- a. Hot-Dip Galvanized Steel: **0.106-inch-** **(2.69-mm-)** diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

G. Finish:

- 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than **1.2 oz./sq. ft.** **(366 g/sq. m)** of zinc.
 - a. Polymer coating over metallic coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet** **(152 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

- a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- E. Line Posts: Space line posts uniformly at 96 inches (2440 mm) o.c maximum.
- F. Post Bracing and Intermediate Rails: Install according to ASTM F567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 - 1. Locate horizontal braces at midheight of fabric 72 inches (1830 mm) or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Top Rail: Install according to ASTM F567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate and Bottom Rails: Secure to posts with fittings.
- I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inch (50-mm) bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches (380 mm) o.c.
- K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- L. Privacy Slats: Install slats in direction indicated, securely locked in place.
 - 1. Vertically, for privacy factor of 70 to 75.

3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION 323113

SECTION 337173

ELECTRIC UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Arrange and coordinate with Utility Company for permanent electric service, payment of Utility Company charges for service, service provisions and utility metering equipment.

1.2 RELATED SECTIONS

- A. Section 260500: Common Work Results for Electrical
- B. Section 260519: 600-Volt Power Conductors and Cables
- C. Section 260526: Grounding and Bonding for Electrical Systems
- D. Section 260533: Raceway and Boxes for Electrical Systems
- E. Section 260553: Identification for Electrical Systems
- F. Section 262416: 600-Volt Rated Panelboards & CB
- G. Section 252413: Switchboards

1.3 SUBMITTALS

- A. In accordance with Division 1 requirements.
- B. Submit copy of switchboard, / switchgear Service entrance Compartment to Utility Company for their review and approval prior to fabrication of the equipment.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated.

1.6 COORDINATION

- A. Coordinate relocation of any overhead or underground lines interfering with the construction with utility company.

PART 2 - PRODUCTS

2.1 SERVICE DESCRIPTION

- A. Utility Company name and contact person or representative is indicated on the drawings.
- B. Electrical Service System Characteristics: 1600 Amp, 208Y/120 Volt, 3-phase. 4-wire.
- C. Service Entrance:
 - 1. Underground service entrance to switchboard service termination section.

2.2 UTILITY METERS

- A. Utility revenue meter will be furnished and installed by Utility Company.

2.3 UTILITY METER BASE

- A. Utility revenue meter base rated for the service size requested. Coordinate with Utility Co. prior to release of Switchboard procurement order.

2.4 ACCEPTABLE MANUFACTURERS

- A. Refer to Section 26050, Part 2 - Products
- B. List of Equipment Manufacturers:
 - a. Shall match manufacturer of main switchboard

2.5 MATERIALS

- A. Provide and install conduits for primary cables by utility company, concrete pad and grounding for utility company transformer, and conduit for secondary service to main switchboard. Comply with all Utility Co. requirements.

B. Furnish and install telephone and cable television service conduits and pullboxes; install conduits to main backboard as shown. All work shall conform to utility company requirements and to Section 26050.

C. Grounding:

1. Provide and install grounding system as noted on the Drawings.
2. Grounding electrode conductor: bare stranded copper type, #4/0 minimum.
3. Install ground wires in rigid conduit.
4. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
5. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
6. Furnish and install solid copper 3/4" x 10'-0" ground rod(s). Where multiple ground rods are shown, install a minimum of 20'-0" apart. Install ground rods in accessible boxes with covers. Furnish and install 2-#4/0 bare copper cables between multiple ground rods and main switchboard ground bus.
7. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
8. Provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
9. Ground all isolated sections of metallic raceways.
10. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures
11. Use approved pressure type solderless connector or use fusion welding for all connections to grounding electrode. Connection visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
12. Connect grounding electrode system to metallic water service entry metallic cold water pipe (if available) with nonferrous clamp and bare copper cable (sized as required) in conduit. Connection shall be accessible for inspection.
13. Connect grounding electrode system to building steel as noted on Drawings. Use exothermic weld, connection shall be accessible for inspection.
14. After installation, test system using the three-point fall of potential method only. Record results and submit to Architect for approval. If resistance to ground exceeds three (3) ohms, install additional ground rods, bonded and interconnected to grounding electrode system. Provide additional grounding until resistance is less than three (3) ohms.

2.6 MAIN SWITCHBOARD

A. General: Switchboard shall be distribution panel type, Nema 3R metal enclosure with ground bus and insulated full capacity neutral bus.

- B. The switchboard shall be braced for a short circuit current shown on drawings. Bracing shall be per NEMA and UL standards.
- C. The switchboard shall comply with all the requirements of the Utility Company.
- D. The switchboard shall be pad-mounted, self- supporting, dead-front and rear, front-operated, front-connected, distribution type. The enclosure shall be 90 inches high, made of cold rolled steel on a structural shape, or formed, steel frame and shall be mounted on two 3-inch, 5-pound continuous channel iron sills, which shall be closed at the ends between the two channels.
- E. This contractor is responsible for the complete installation of the new switchboard within the space provided (both vertical and horizontal) and shall verify and/or coordinate all dimensions prior to ordering equipment. Proper allowances should be included to allow complete installation and erection.
- F. The switchboard shall be a minimum of 20 inches deep and shall be constructed of National Electrical Code (NEC) gauge steel.
- G. The switchboard shall be provided with a cable pull section at the top of the switchboard. Provide a minimum 12 inches of vertical clearance between the cable terminal lugs bolted to the switchboard busses and the top and bottom of the switchboard enclosure. Horizontal pull sections and gutters shall be kept free and clear of busses. Where busses cross vertical pull sections, the busses shall be insulated.
- H. All connections between bus bars shall be of a bolted type using Belleville washers. Clamps will not be accepted. All bus bars shall be accurately formed, and all holes shall be made in a manner which will permit bus bars and connections to be fitted into place without being forced.
- I. The design of all current-carrying devices or parts of the switchboard shall conform to the standard specified in the related sections of Underwriters' Laboratories, Inc. (UL) No. UL-891 and National Electric Manufacturer's Association (NEMA) Standard PB-2, except as these characteristics may be modified herein.
- J. Bus bars, connection bars and wiring on the back of the switchboard shall be arranged so that maximum accessibility is provided for cable connections from the front.
- K. Ampere ratings for rectangular bus bars shall be in accordance with the temperature rise standard of National Electric Manufacturer's Association (NEMA) and the Underwriters' Laboratories, Inc. (UL).
- L. The enclosure shall be chemically cleaned by parkerizing, bonderizing or phosporizing as a unit after all welding has been completed. The enclosure shall then be painted with a rust- resisting primer coat of paint and shall be finished with a coat of light gray, baked enamel.

- M. Each section shall be bussed for the full connected load of that section. Extend bussing to spare circuit breaker "Spaces." Drill busses for future circuit breakers, and provide breaker connector hardware as required.
- N. Provide copper bus bars and connections with silver-plated contact surfaces.
- O. The contact surfaces and studs of all devices to which bus connections are made shall also have silver-plated surfaces.
- P. Locate ground bus, with a cross-section equal to at least 25 percent of the capacity of the main bus rating, in the back of the switchboard and extend bus throughout the length of the switchboard assembly. Ground each housing of the assembly directly to this bus.
- Q. Rigidly support all bus and connection bars and current transformers.
- R. Fit all nuts and connections with locking devices to prevent loosening.
- S. Provide load connections with solderless lugs. Factory-install all devices shown on Drawings as specified herein.
- T. Properly identify the "high leg" of 4-wire delta connected systems as required by NEC 384-3(e).
- U. Provide half-inch copper braid pigtail at side of switchboard enclosure for termination of signal system ground cables. Pigtail to be located on side of distribution section.
- V. Provide ground fault protection when indicated on the single line diagram or where otherwise noted on the plans. Protection shall consist of a current sensor, relaying device, and the appropriately sized main overcurrent protection device.
- W. Provide a bonding strap from the equipment ground bus to the neutral bus.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. In accordance with Division 1 requirements.
- B. Verify that service equipment is ready to be connected and energized.

3.2 INSTALLATION

- A. Install service entrance conduits from pull box to building service entrance equipment. Utility Company will provide service entrance conductors.

- B. Electric Service: Coordinate with City of Ukiah Electric Department and district for electric service. Furnish and install all materials and labor necessary for complete installation as noted on drawings. Submit shop drawings and obtain approval from the Utility Co. prior to fabrication.
- C. Excavate and trench as necessary for the electrical installation, and when the work has been installed, inspected and approved, backfill all excavations with clean earth from excavation, or imported sandy soil in maximum 8" (eight-inch) layers, moisten and machine tamp to 95% compaction, and restore the ground and/or paving or floor surfaces to their original condition.

END OF SECTION