

CITY AND BOROUGH OF WRANGELL



Lift Station Generator Enclosure

PROJECT MANUAL

January 25, 2022

SECTION 00 01 01

PROJECT IDENTIFICATION PAGE

PROJECT MANUAL

PROJECT IDENTIFICATION

BIDDING REQUIREMENTS

CONDITIONS OF THE CONTRACT

GENERAL REQUIREMENTS

AND SPECIFICATIONS FOR:

LIFT STATION GENERATOR ENCLOSURE

**WOOD STREET
WRANGELL, ALASKA 99929**

CITY AND BOROUGH OF WRANGELL
205 BRUEGER STREET, P.O. BOX 531
WRANGELL, ALASKA 99929

SECTION 00 01 03

TITLE PAGE

PROJECT TITLE AND LOCATION: LIFT STATION GENERATOR ENCLOSURE
WOOD STREET
WRANGELL, ALASKA 99929

OWNER: City and Borough of Wrangell

ARCHITECTS: Wold Architects and Engineers
332 Minnesota Street, Suite W2000
Saint Paul, Minnesota 55101
(651) 227-7773

CIVIL ENGINEER: R & M Engineering Ketchikan, Inc.
355 Carlanna Lake Road, #200
Ketchikan, Alaska 99901
(907) 305-0820

STRUCTURAL ENGINEER: PSM Engineers
2200 Sixth Avenue, #601
Seattle, Washington 08121
(206) 239-7714

MECHANICAL ENGINEER: Wold Architects And Engineers
332 Minnesota Street, Suite W2000
Saint Paul, Minnesota 55101
(651) 227-7773

ELECTRICAL ENGINEER: Wold Architects And Engineers
332 Minnesota Street, Suite W2000
Saint Paul, Minnesota 55101
(651) 227-7773

DATE: January 24, 2022

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SECTION 00030 - NOTICE INVITING BIDS

OBTAINING CONTRACT DOCUMENTS. The Contract Documents are entitled:

Lift Station Generator Enclosure
Wood Street
Wrangell, Alaska 99929

Notice is hereby given that the City and Borough of Wrangell, Alaska will receive sealed bids for the construction of **Lift Station Generator Enclosure**.

The Contract Documents may be downloaded free of charge on the City & Borough of Wrangell website (www.wrangell.com) under the Bids and RFPs section. Downloading Contract Documents from the City & Borough of Wrangell's website requires registration with the Borough Clerk to be placed on the Plan Holders List and to ensure receipt of subsequent Addenda. Failure to register may adversely affect your proposal. It is the Offeror's responsibility to ensure that they have received all Addenda affecting this Solicitation. To be registered, contact the Borough Clerk at 907-874-2381; Borough Clerks Office, 205 Brueger Street, Wrangell, Alaska 99929; or at clerk@wrangell.com.

DESCRIPTION OF WORK. WORK consists of all activities necessary to construct Lift Station Generator Enclosure and install ER Generator.

SITE OF WORK. The WORK is located at Wood Street in Wrangell, Alaska.

COMPLETION OF WORK. The OWNER will open the work site to the CONTRACTOR immediately following the Notice to Proceed. Substantial completion must be reached by September 30, 2022.

BIDDING, CONTRACT, or TECHNICAL QUESTIONS. All communications relative to this WORK, prior to opening Bids, shall be directed to the following:

Amber Al-Haddad
Capital Facilities Director
Telephone: (907) 874-3902
Email: aal-haddad@wrangell.com

BID SECURITY. Each bid shall be accompanied by a bid bond, cashier's check or certified check made payable to the City and Borough of Wrangell in the amount of five percent (5%) of the total bid price. This serves as a guarantee that the Bidder, if its Bid is accepted, will promptly execute the Agreement. A Bid shall not be considered unless one of the forms of Bidder's security is enclosed with it.

RECEIPT OF BIDS. Sealed bids will be received by the City and Borough of Wrangell, Post Office Box 531, Wrangell, Alaska 99929, located at the Borough Clerk's Office, 205 Brueger Street, Wrangell, Alaska 99929, until 2:00 PM prevailing time on March 30, 2022, at which time they shall be opened and read aloud. Opening date and time may be changed to a later date or time via Addendum. Clearly mark on the outside of the envelope "**Sealed Bid for Lift Station Generator Enclosure**".

SUBCONTRACTORS. The apparent low Bidder is required to complete and submit the following documentation within five (5) calendar days following the posting of bids by the City and Borough of Wrangell:

- Section 00360 - Subcontractor Report.

SECTION 00030 - NOTICE INVITING BIDS

CONTRACTOR'S LICENSE. All contractors are required to have a current Alaska Contractor's License, prior to submitting a Bid, and a current Alaska Business License prior to award of the bid.

BID TO REMAIN OPEN. The Bidder shall guarantee the Bid for a period of 60 Days from the date of Bid opening. Any component of the Bid including additive alternates may be awarded anytime during the 60 Days.

OWNER'S RIGHTS RESERVED. The OWNER reserves the right to reject any or all Bids, to waive any informality in a Bid, and to make award to the lowest responsive, responsible Bidder as it may best serve the interests of the OWNER.

OWNER: The City and Borough of Wrangell

By: _____ Date _____
Jeff Good, Borough Manager

END OF SECTION

SECTION 00100 - INSTRUCTIONS TO BIDDERS

1.0 DEFINED TERMS. Terms used in these “Instructions to Bidders” and the “Notice Inviting Bids” which are defined in the General Conditions have the meanings assigned to them in the General Conditions. The term “Bidder” means one who submits a Bid directly to the OWNER, as distinct from a sub-bidder, who submits a Bid to a Bidder.

2.0 INTERPRETATIONS AND ADDENDA.

A. **INTERPRETATIONS.** All questions about the meaning or intent of the Contract Documents are to be directed to the ENGINEER. Interpretations or clarifications considered necessary by the ENGINEER in response to such questions will be issued by Addendum and emailed to all parties recorded by the OWNER as having received the Contract Documents. Questions received less than 7 Days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect.

B. **ADDENDA.** Addenda may be issued to modify the Contract Documents as deemed advisable by the OWNER. The OWNER may issue addenda by fax, with a follow-up addendum copy issued by regular mail. Addenda may be emailed less than 7 Days prior to the anticipated Bid opening. The OWNER will make reasonable attempts to provide addenda; however, it is strongly recommended by the OWNER that Bidders independently confirm the contents, number, and dates of each Addenda prior to submitting a Bid. All Bidders who submit a bid shall be deemed to have received and reviewed all addenda.

3.0 FAIR COMPETITION. More than one Bid from an individual, firm, partnership, corporation, or association under the same or different names will not be considered. If the OWNER believes that any Bidder is interested in more than one Bid for the WORK contemplated, all Bids in which such Bidder is interested will be rejected. If the OWNER believes that collusion exists among the Bidders, all Bids will be rejected.

4.0 RESPONSIBLE BIDDER. Only responsive Bids from responsible Bidders will be considered. A Bid submitted by a Bidder determined to be not responsible may be rejected. A responsible Bidder is one who is considered to be capable of performing the WORK.

A. The general standards for responsibility are to determine the CONTRACTOR’s ability to perform WORK adequately, considering the CONTRACTOR’s

1. Financial Resources
2. Ability to Meet Delivery Standards
3. Past Performance Record
 - a. References from others on CONTRACTOR’s performance
 - b. Record of performance on prior OWNER contracts
4. Record of Integrity
5. Obligations to OWNER
 - a. Bidders must be registered as required by law and in good standing for all amounts owed to the OWNER within 5 Days of OWNER’s Notice of Intent to Award.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

- B. Special standards for responsibility, if applicable, will be specified. These special standards establish minimum standards or experience required for a responsible Bidder on a specific contract.
- C. Before a Bid is considered for award, a Bidder may be requested to submit information documenting its ability and competency to perform the WORK, according to general standards of responsibility and any special standards which may apply. It is Bidder's responsibility to submit sufficient, relevant, and adequate information. OWNER will make its determination of responsibility and has no obligation to request clarification or supplementary information.

5.0 RESPONSIVE BIDS. Only responsive Bids will be considered. Bids may be considered non-responsive and may be rejected. Some of the reasons a Bid may be rejected for being non-responsive are:

- A. If the Bid is on a form other than that furnished by the OWNER, or legible copies thereof; or if the form is altered or any part thereof is detached; or if the Bid is improperly signed.
- B. If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.
- C. If the Bidder adds any unauthorized conditions, limitations, or provisions reserving the right to accept or reject any award, or to enter into a contract pursuant to an award. This does not exclude a Bid limiting the maximum gross amount of awards acceptable to any one Bidder at any one bid opening, provided that any selection of awards will be made by the OWNER.
- D. If the Bid does not contain a unit price for each pay item listed, except in the case of authorized alternate pay items.
- E. If the Bidder has not acknowledged receipt of each Addendum.
- F. If the Bidder fails to furnish an acceptable Bid Guaranty with the Bid.
- G. If any of the unit prices bid are excessively unbalanced (either above or below the amount of a reasonable Bid) to the potential detriment of the OWNER.
- H. If a bid does not conform to Articles 15.0 and 16.0 of this Section.

6.0 BIDDER'S EXAMINATION OF CONTRACT DOCUMENTS AND SITE. It is the responsibility of each Bidder before submitting a Bid:

- A. To examine thoroughly the Contract Documents, and other related data identified in the bidding documents (including "technical data" referred to below):
 - 1. To visit the site to become familiar with and to satisfy the Bidder as to the general and local conditions that may affect cost, progress, or performance of the WORK;
 - 2. To consider federal, state and local laws and regulations that may affect cost, progress, or performance of the WORK;

SECTION 00100 - INSTRUCTIONS TO BIDDERS

3. To study and carefully correlate the Bidder's observations with the Contract Documents, and other related data; and
4. To notify the ENGINEER of all conflicts, errors, or discrepancies in or between the Contract Documents and such other related data.

7.0 REFERENCE IS MADE TO THE SUPPLEMENTARY GENERAL CONDITIONS FOR IDENTIFICATION OF:

- A. Those reports of explorations and tests of subsurface conditions at the site which have been utilized by the Engineer of Record in the preparation of the Contract Documents. The Bidder may rely upon the accuracy of the technical data contained in such reports; however, the interpretation of such technical data is the responsibility of the Bidder.
- B. Those drawings of physical conditions in or relating to existing surface and subsurface conditions (except underground utilities) which are at, or contiguous to, the site have been utilized by the Engineer of Record in the preparation of the Contract Documents. The Bidder may rely upon the accuracy of the technical data contained in such drawings; however, the interpretation of such technical data is the responsibility of the Bidder.
- C. Copies of such reports and drawings will be made available by the OWNER to any Bidder on request if said reports and drawings are not bound herein. Those reports and drawings are not part of the Contract Documents, but the technical data contained therein upon which the Bidder is entitled to rely, as provided in Paragraph SGC-4.2 of the Supplementary General Conditions, are incorporated herein by reference.
- D. Information and data reflected in the Contract Documents with respect to underground utilities at or contiguous to the site is based upon information and data furnished to the OWNER and the Engineer of Record by the owners of such underground utilities or others, and the OWNER and ENGINEER do not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary General Conditions, or in Section 01530 - Protection and Restoration of Existing Facilities.
- E. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, underground utilities and other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraphs 4.2, 4.3, and 4.4 of the General Conditions.
- F. Before submitting a Bid, each Bidder will, at its own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and underground utilities) at, or contiguous to, the site or otherwise which may affect cost, progress, or performance of the WORK and which the Bidder deems necessary to determine its Bid for performing the WORK in accordance with the time, price, and other terms and conditions of the Contract Documents.
- G. On request in advance, the OWNER will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and shall clean up and restore the site to its former condition upon completion of such explorations.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

- H. The lands upon which the WORK is to be performed, rights-of-way and easements for access thereto and the lands designated for use by the CONTRACTOR in performing the WORK are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by the CONTRACTOR. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by the OWNER unless otherwise provided in the Contract Documents.
- I. The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of Article 6, "Bidder's Examination of Contract Documents and Site" herein, that without exception the Bid is premised upon performing the WORK required by the Contract Documents and such means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the WORK.

8.0 BID FORM.

- A. The Bid shall be made on the Bid Schedule(s) bound herein, or on legible and complete copies thereof, and shall contain the following: Sections 00300 - Bid, 00310 - Bid Schedule, and the required Bid Security. In the event there is more than one Bid Schedule, the Bidder may bid on any individual schedule or on any combination of schedules. The envelope enclosing the sealed Bids shall be plainly marked in the upper left-hand corner with the name and address of the Bidder and shall bear the words "BID FOR," followed by the title of the Contract Documents for the WORK, the name of the OWNER, the address where Bids are to be delivered or mailed to, and the date and hour of opening of Bids. The Bid Security shall be enclosed in the same envelope with the Bid.
- B. All blanks on the Bid Form and Bid Schedule(s) must be completed in ink or typed.
- C. Bids by corporations shall be executed in the corporate name by the president, a vice-president (or another corporate officer). The corporate address and state of incorporation must appear below the signature.
- D. Bids by partnerships must be executed in the partnership name and be signed by a managing partner, and the official address of the partnership must appear below the signature.
- E. The Bidder's Bid shall be signed with ink. All names must be printed or typed below the signature.
- F. The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form. Failure to acknowledge Addenda shall render Bid non-responsive and shall cause its rejection.
- G. The address to which communications regarding the Bid are to be directed must be shown.
- H. All Bidders shall provide evidence of authority to conduct business in Alaska to the extent required by law.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

- I. On Projects including Federal funding, any contractor otherwise qualified to perform the WORK is not required to be licensed nor to submit application for license in advance of submitting a Bid or having such Bid considered; provided, however, that such exemption does not constitute a waiver of the OWNER's right under existing license laws to require a contractor, determined to be a successful Bidder, to be licensed to do business as a contractor in the State of Alaska in connection with the award of a contract to the successful Bidder.
- J. A Bid for the WORK will not be accepted from a contractor who does not hold a valid Alaska Business License and a valid Contractor's License in Alaska (applicable to the type of work bid upon) at the time of opening Bids.
- 9.0 QUANTITIES OF WORK.** The quantities of WORK, or material, stated in unit price items of the Bid are supplied only to give an indication of the general scope of the WORK; the OWNER does not expressly or by implication agree that the actual amount of WORK, or material, will correspond therewith, and reserves the right after award to increase or decrease the amount of any unit price item of the WORK by an amount up to and including 25 percent of any Bid item, without a change in the unit price, and shall include the right to delete any Bid item in its entirety, or to add additional Bid items up to and including an aggregate total amount not to exceed 25 percent of the Contract Price (see General Conditions, Article 10 Changes In the Work).
- 10.0 SUBSTITUTE OR "OR-EQUAL" ITEMS.** The procedure for the submittal of substitute or "or-equal" products is specified in Section 01300 - Contractor Submittals.
- 11.0 SUBMISSION OF BIDS.** The Bid shall be delivered by the time and to the place stipulated in the Notice Inviting Bids. It is the Bidder's sole responsibility to see that its Bid is received in proper time. Oral, telegraphic, telephonic or faxed Bids will not be considered.
- 12.0 BID SECURITY, BONDS, AND INSURANCE.** Each Bid shall be accompanied by a certified, or cashier's check, or approved Bid Bond in an amount of at least 5 percent of the total Bid price. The "total Bid price" is the amount of the base bid, plus the amount of alternate bids, if any, which total to the maximum amount for which the contract could be awarded. Said check or Bond shall be made payable to the OWNER and shall be given as a guarantee that the Bidder, if offered the WORK, will enter into an Agreement with the OWNER, and will furnish the necessary insurance certificates, Payment Bond, and Performance Bond; each of said Bonds, if required, and insurance amounts shall be as stated in the Supplementary General Conditions. In case of refusal or failure to enter into said Agreement, the check or Bid Bond, as the case may be, shall be forfeited to the OWNER. If the Bidder elects to furnish a Bid Bond as its Bid security, the Bidder shall use the Bid Bond form bound herein, or one conforming substantially to it in form. Bid Bonds must be accompanied by a legible power of attorney.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

- 13.0 RETURN OF BID SECURITY.** Within 14 Days after award of the contract, the OWNER will return the Bid securities accompanying such of the Bids as are not considered in making the award. All other Bid securities will be held until the Agreement has been executed. They will then be returned to the respective Bidders whose Bids they accompanied.
- 14.0 DISCREPANCIES IN BIDS.** In the event there is more than one pay item in a Bid Schedule, the Bidder shall furnish a price for all pay items in the schedule, and failure to do so may render the Bid non-responsive and cause its rejection. In the event there are unit price pay items in a Bid Schedule and the “amount” indicated for a unit price pay item does not equal the product of the unit price and quantity, the unit price shall govern and the amount will be corrected accordingly, and the Bidder shall be bound by said correction. In the event there is more than one pay item in the Bid Schedule and the total indicated for the schedule does not agree with the sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the schedule will be corrected accordingly, and the Bidder shall be bound by the correction.
- 15.0 BID MODIFICATIONS AND UNAUTHORIZED ALTERNATIVE BIDS.**
- A. Any Bidder may modify a Bid by mail, email (clerk@wrangell.com), or fax (**Fax: 907-874-3952**) provided that such modification is received by the OWNER prior to the time set for opening of Bids. Bid modifications shall be made using the project Modified Bid Schedule form and shall be used with bid modifications made as a line by line pay item adjustment per the schedule. Bidders are strongly advised to telephone the City & Borough of Wrangell (Telephone: 907-874-2381) to confirm the successful and timely transmission of all email and fax Bid modifications.
- An email or fax Bid Modification shall not reveal the Bid price but shall provide the addition or subtraction or other modification so that the final prices will not be known by the OWNER until the sealed Bid is opened. Modifications shall include both the modification of the unit bid price and the total modification of each item modified. The OWNER shall not be responsible for its failure to receive fax modifications whether such failure is caused by transmission line problems, fax device problems, operator error or otherwise.
- B. Unauthorized conditions, limitations, or provisions attached to the Bid will render it informal and cause its rejection as being non-responsive. The completed bid forms shall be without interlineation, alterations, or erasures in the printed text. All changes shall be initialed by the person signing the Bid. Alternative bids will not be considered unless called for.
- 16.0 WITHDRAWAL OF BID.** The Bid may be withdrawn by the Bidder by means of a written request, signed by the Bidder or its properly authorized representative. Such written request must be delivered to the place stipulated in the Notice Inviting Bids for receipt of Bids prior to the scheduled closing time for receipt of Bids.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

17.0 AWARD OF CONTRACT.

- A. Award of a contract, if it is awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Technical Specifications and will be made to the lowest responsive, responsible Bidder whose Bid complies with all the requirements prescribed. Unless otherwise specified, any such award will be made within the period stated in the Notice Inviting Bids that the Bids are to remain open. Unless otherwise indicated, a single award will be made for all the pay items in an individual Bid Schedule.
- B. If the OWNER has elected to advertise this Project with a base bid and additive or deductive alternates, the OWNER may elect to award the contract for the base bid, or the base bid plus one or more alternates selected by the OWNER. In either case, award shall be made to the responsive, responsible Bidder offering the lowest total bid for the WORK to be awarded.
- C. Low Bidder will be determined based on the lowest total of the base bid plus combinations of additive alternatives as deemed in the best interest of the OWNER.
- D. A Local Bidder Preference shall apply to all City and Borough of Wrangell procurements, except when restricted by state or federal regulations. To be considered a qualifying bidder, bidders shall meet the requirements of the Local Bidder Preference ordinance, according to WMC 5.10.040 (D). The Owner may request documentation to support entries made on this form.

The Wrangell Municipal Code (WMC) Article 5.10.040, Section D. LOCAL BIDDER PREFERENCE AWARD reads:

- 1. Unless contrary to federal or state law or regulation, or as otherwise provided in section (D)(2) of this section, a contract for, or purchase of, supplies, materials, equipment, contractual services, or public improvements shall be awarded to a local bidder where the bid by such local bidder is in all material respects comparable to the lowest responsible nonlocal bid, and if the amount bid by such local bidder does not exceed the lowest responsible nonlocal bid by more than:
 - a. Five percent of the amount bid by the lowest responsible nonlocal bidder if that nonlocal bidder's bid is \$1,000,000 or less;
 - b. Three percent of the amount bid by the lowest responsible nonlocal bidder if that nonlocal bidder's bid is \$1,000,001 or more.
- 2. This preference shall not be interpreted to mean that the borough is precluded from making the purchase from whatever source is most advantageous to the borough after considering all factors in the public interest even when the price quoted by the local bidder satisfies subsection (D)(1)(a) or (b) of this section.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

3. "Local bidder" for purposes of the section shall mean a bidder who:
 - a. Holds a current Alaska business license;
 - b. Submits a bid for goods or services under the name appearing on the person's current Alaska business license;
 - c. Has maintained a place of business within the boundaries of the borough for a period of six months immediately preceding the date of the bid;
 - d. Is not delinquent in the payment of any utilities, taxes, charges or assessments owing to the borough on account of that business;
 - e. Is incorporated or qualified to do business under the laws of Alaska with its principal place of business in the borough, is a proprietorship and the proprietor is a resident of the borough, or is a partnership and all partners are residents of the City and Borough of Wrangell;
 - f. If a joint venture, all joint venture partners must qualify under subsection (D)(3)(a) through (e) of this section;
 - g. The manager may require such documentation or verification by the person claiming to be a local bidder as is deemed necessary to establish the requirements of this section.

18.0 EXECUTION OF AGREEMENT.

- A. All Bids must be approved by the Wrangell Borough Assembly. After the Assembly has approved the award, the OWNER will issue a Notice of Intent to Award to the approved Bidder following the Bid Opening. The Bidder to whom award is made shall execute a written Agreement with the OWNER on the Agreement form, Section 00500, and shall secure all insurance and furnish all certificates and bonds required by the Contract Documents within 10 Days from the date stated in the Notice of Intent to Award letter.
- B. Failure or refusal to enter into the Agreement as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the Bid security. If the lowest responsive, responsible Bidder refuses or fails to execute the Agreement, the OWNER may award the contract to the second lowest responsive, responsible Bidder. If the second lowest responsive, responsible Bidder refuses or fails to execute the Agreement, the OWNER may award the contract to the third lowest responsive, responsible Bidder. On the failure or refusal of such second or third lowest Bidder to execute the Agreement, each such Bidder's Bid securities shall be likewise forfeited to the OWNER.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

19.0 LIQUIDATED DAMAGES. Provisions for liquidated damages are set forth in the Agreement.

20.0 PERMITS. The CONTRACTOR is responsible for all WORK associated with meeting any local, state, and federal permit requirements.

SECTION 00100 - INSTRUCTIONS TO BIDDERS

END OF SECTION

SECTION 00300 - BID

BID TO: CITY & BOROUGH OF WRANGELL

For Project Name: _____

By Company Name: _____

To the Contracting Officer, City and Borough of Wrangell:

1. In compliance with your Invitation to Bid for the above-referenced project, the undersigned proposes to furnish and deliver all the materials and to perform all the work and labor required in the construction of the Project, located in Wrangell, Alaska, according to all of the terms in the plans and specifications and for the amount and prices named herein as indicated on the Bid Schedule which is made a part of this Bid.
2. If this Bid is accepted, the undersigned does hereby agree to enter into an Agreement with the OWNER on the form included in the Contract Documents (as defined in Article 7 of Section 00500 - Agreement) to perform the WORK as specified or indicated in said Contract Documents.
3. This Bid will remain open for the period stated in the "Notice Inviting Bids" unless otherwise required by law. The undersigned will enter into an Agreement within the time and in the manner required in the "Notice Inviting Bids" and the "Instructions to Bidders." The undersigned agrees to commence the work within 10 calendar days, unless otherwise stipulated in the contract, and to complete the work within by the Substantial Completion Date provided in the contract, after the effective date of the Notice to Proceed, unless extended in writing by the Owner.
4. The undersigned will furnish insurance certificates, Payment Bond, Performance Bond, and any other documents as required by the Contract Documents as surety for the full, complete and faithful performance of this contract.
5. Bidder has familiarized itself with the nature and extent of the Contract Documents, WORK, site, locality where the WORK is to be performed, the legal requirements (federal, state and local laws, ordinances, rules, and regulations), and the conditions affecting cost, progress or performance of the WORK and has made such independent investigations as Bidder deems necessary.
6. The Undersigned declares that they have carefully examined the contract requirements and that they have made a personal examination of the site of the work; that they understand that the quantities, where such are specified in the Bid Schedule or on the plans for this project, are approximate only and subject to increase or decrease, and that they are willing to perform increased or decreased quantities of work at unit prices bid under the conditions set forth in the Contract Documents.
7. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

SECTION 00300 - BID

8. To all the foregoing, and including all Bid Schedule and information required of Bidder contained in this Bid Form, said Bidder further agrees to complete the WORK required under the Contract Documents within the Contract Time stipulated in said Contract Documents, and to accept in full payment therefor the Contract Price based on the total bid price(s) named in the Bid Schedule.
9. The undersigned has examined copies of all the Contract Documents and acknowledges receipt of the following addenda to the drawings and/or specifications

| Addenda No. | Date Issued | Addenda No. | Date Issued |
|-------------|-------------|-------------|-------------|
| | | | |
| | | | |
| | | | |

Give number and date of each Addendum above. Failure to acknowledge receipt of all Addenda will cause the Bid to be non-responsive and shall cause its rejection.

10. The undersigned has read the forgoing and hereby agrees to the conditions stated therein by affixing their signature below.

| | |
|---|---|
| Dated: _____ Contractor's License No.: _____ Telephone No.: _____ Facsimile No.: _____ | Bidder: _____ (Company Name) By: _____ (Signature in Ink) Printed Name: _____ Title: _____ Address: _____ (Street or P.O. Box) (City, State, Zip) |
|---|---|

11. **DOCUMENTS REQUIRED FOR BID. TO BE CONSIDERED, ALL BIDDERS MUST COMPLETE AND INCLUDE THE FOLLOWING AT THE TIME OF THE BID OPENING:**
 - Bid form, Section 00300
 - Bid Schedule, Section 00310
 - Bid Security, Section 00320
 - Modified Bid Schedule, Section 00330 (any bid revisions must be submitted by the Bidder prior to the bid opening.)
12. **REQUIRED AFTER NOTICE OF APPARENT LOW BIDDER.** Unless otherwise notified by the OWNER, the apparent low Bidder is required to complete and submit the following document within five (5) working days following notice of apparent low bidder:
 - Subcontractor Report, Section 00360

SECTION 00300 - BID

13. **REQUIRED FOR AWARD.** To be awarded the contract, the successful Bidder must complete and submit, within ten (10) days after the date of the “Notice of Intent to Award” letter, the following executed documents:

- Alaska Business License
- Contractor’s License
- Agreement Form, Section 00500
- Performance Bond, Section 00610
- Payment Bond, Section 00620
- Certificates of Contractor Insurance Section 00700 and Section 00800

14. The successful Bidder will be required to submit, within ten Days after the date stated in the “Notice to Proceed” the following executed documents:

- Certificates of Subcontractor Insurance Section 00700 and Section 00800
- One executed copy of each subcontract for WORK that exceeds one half of one percent of the intended contract award amount.

SECTION 00300 - BID

END OF SECTION



CITY AND BOROUGH OF WRANGELL

LOCAL BIDDER PREFERENCE AFFIDAVIT

In response to the Invitation to Bid for:

Project Name: _____

I certify under penalty of perjury that (Bidder Name)

_____ qualifies for the City and Borough of Wrangell's Local Bidder's Preference under the following conditions:

- A. If a bidder qualifies under WMC 5.10.040 (D) as a Local Bidder and is a qualifying entity, a five percent (5%) bid preference shall be applied to the bid price for the purpose of award. In this subsection, a "qualifying entity" means a local bidder who:
1. Holds a current Alaska business license;
 2. Submits a bid for goods or services under the name appearing on the person's current Alaska business license;
 3. Has maintained a place of business within the boundaries of the borough for a period of six months immediately preceding the date of the bid;
 4. Is not delinquent in the payment of any utilities, taxes, charges or assessments owing to the borough on account of that business;
 5. Is incorporated or qualified to do business under the laws of Alaska with its principal place of business in the borough, is a proprietorship and the proprietor is a resident of the borough, or is a partnership and all partners are residents of the City and Borough of Wrangell;
 6. If a joint venture, all joint venture partners must qualify under subsection (D)(3)(a) through (e) of this section.

The Owner may request documentation to support entries made on this form.

Authorized Signature

Printed Name

Date

SECTION 00310 - BID SCHEDULE

Bidders Please Note: Before preparing this Bid Schedule, carefully read the Invitation for Bids, Instructions to Bidders, and the Technical Specifications.

The Bidder shall insert a unit price opposite each pay item in the Bid Schedule and multiply the unit price by the estimated quantities for this contract. No price is to be tendered for any item not appearing in the Bid Schedule.

In the event there is more than one pay item in the Bid Schedule and the total indicated for the schedule does not agree with the sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the schedule will be corrected accordingly, and the Bidder shall be bound by the correction.

A Local Bidder Preference of five percent (5%) _____ will, _____ will not be utilized on this project.

Lift Station Generator Enclosure - BASE BID

| Pay Item No. | Pay Item Description | Pay Unit | Approximate Quantity | Unit Price | | Amount | |
|--------------|----------------------|----------|----------------------|------------|-------|---------|-------|
| | | | | Dollars | Cents | Dollars | Cents |
| 01505.1 | Mobilization | LS | All Req'd | | | | |
| 01550.1 | | LS | All Req'd | | | | |

TOTAL Lift Station Generator Enclosure BASE BID AMOUNT IN FIGURES: \$ _____

TOTAL Lift Station Generator Enclosure BASE BID AMOUNT IN WORDS:

BIDDER NAME: _____

BIDDER'S TELEPHONE: _____

SECTION 00310 - BID SCHEDULE

END OF SECTION

SECTION 00320 - BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that _____

_____ as Principal, and _____

as Surety, are held and firmly bound unto the **CITY & BOROUGH OF WRANGELL** hereinafter called "OWNER," in the sum of _____ dollars, (not less than five percent (5%) of the total amount of the Bid) for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under the Bid Schedule of the OWNER's Contract Documents entitled

Lift Station Generator Enclosure

NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in the manner required in the "Notice Inviting Bids" and the "Instructions to Bidders" enters into a written Agreement on the form of Agreement bound with said Contract Documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond, then this obligation shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said OWNER and OWNER prevails, said Surety shall pay all costs incurred by said OWNER in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this _____ day of _____, 20____

(SEAL) _____
(Principal)

(SEAL) _____
(Surety)

By: _____
(Signature)

By: _____
(Signature)

SECTION 00320 - BID BOND

END OF SECTION

SECTION 00330 – MODIFIED BID SCHEDULE

Bidders Please Note: Before preparing this Modified Bid Schedule, carefully read the Invitation for Bids, Instructions to Bidders, and the Technical Specifications.

A Modified Bid Schedule shall not reveal the Bid price but shall provide the addition (+) or subtraction (-) to the line by line pay item so that the final prices will not be known by the OWNER until the sealed Bid is opened. Modifications shall include both the modification of the unit bid price and the total modification of each pay item modified.

Changes to the adjusted total bid amount will be computed by the Owner.

Lift Station Generator Enclosure - BASE BID

| Pay Item No. | Pay Item Description | REVISION TO | REVISION TO |
|--------------|----------------------|---------------------------|--------------------------------|
| | | UNIT PRICE BID AMOUNT +/- | TOTAL LINE ITEM BID AMOUNT +/- |
| | | | |
| | | | |

BIDDER NAME: _____
BIDDER SIGNATURE: _____
BID MODIFICATION DATE: _____
BIDDER'S TELEPHONE: _____

SECTION 00330 – MODIFIED BID SCHEDULE

END OF SECTION

SECTION 00360 - SUBCONTRACTOR REPORT

LIST OF SUBCONTRACTORS

The apparent low Bidder must submit a list of Subcontractors that the Bidder proposes to use in the performance of this contract by close of business on the fifth calendar day following the posting of the bid tabulations. If the fifth calendar day falls on a weekend or holiday, the report is due by close of business on the next business day following the weekend or holiday. The list must include each Subcontractor's name, address, location, evidence of valid Alaska Business License, and valid Alaska Contractor's Registration under AS 08.18. *If no Subcontractors are to be utilized in the performance of the WORK, write in ink or type "NONE" on line (1) below.*

| <u>SUBCONTRACTOR</u> | ¹ AK Contractor <u>License No.</u> | ¹ <u>Contact Name</u> | <u>Type of</u> | <u>Contract</u> | ✓ if <u>DBE</u> |
|----------------------------|--|----------------------------------|----------------|-----------------|--------------------------|
| <u>ADDRESS</u> | ² AK Business <u>License No.</u> | ² <u>Phone No.</u> | <u>Work</u> | <u>Amount</u> | |
| 1. _____ _____ _____ | 1 _____ 2 _____ | _____ _____ | _____ _____ | \$ _____ | <input type="checkbox"/> |
| 2. _____ _____ _____ | 1 _____ 2 _____ | _____ _____ | _____ _____ | \$ _____ | <input type="checkbox"/> |
| 3. _____ _____ _____ | 1 _____ 2 _____ | _____ _____ | _____ _____ | \$ _____ | <input type="checkbox"/> |
| 4. _____ _____ _____ | 1 _____ 2 _____ | _____ _____ | _____ _____ | \$ _____ | <input type="checkbox"/> |

I certify that the above listed Alaska Business License(s) and CONTRACTOR Registration(s), if applicable, were valid at the time Bids were opened for this Project.

CONTRACTOR, Authorized Signature

CONTRACTOR, Printed Name

SECTION 00360 - SUBCONTRACTOR REPORT

- A. A Bidder may replace a listed Subcontractor if the Subcontractor:
1. fails to comply with AS 08.18;
 2. files for bankruptcy or becomes insolvent;
 3. fails to execute a contract with the Bidder involving performance of the WORK for which the Subcontractor was listed and the Bidder acted in good faith;
 4. fails to obtain bonding;
 5. fails to obtain insurance acceptable to the OWNER;
 6. fails to perform the contract with the Bidder involving work for which the Subcontractor was listed;
 7. must be substituted in order for the CONTRACTOR to satisfy required state and federal affirmative action requirements;
 8. refuses to agree or abide with the Bidder's labor agreement; or
 9. is determined by the OWNER not to be a responsible Bidder.
- B. If a Bidder fails to list a Subcontractor or lists more than one Subcontractor for the same portion of WORK, the Bidder shall be considered to have agreed to perform that portion of WORK without the use of a Subcontractor and to have represented the Bidder to be qualified to perform that WORK.
- C. A Bidder who attempts to circumvent the requirements of this section by listing as a Subcontractor another contractor who, in turn, sublets the majority of the WORK required under the contract violates this section.
- D. If a contract is awarded to a Bidder who violates this section, the OWNER may:
1. cancel the contract; or
 2. after notice and a hearing, assess a penalty on the Bidder in an amount that does not exceed 10 percent of the value of the subcontract at issue.
- E. For contract award, the apparent low Bidder must submit one copy of each subcontract, to the OWNER, for WORK with a value of greater than one half of one percent of the intended award amount.
- F. An apparent low Bidder who fails to submit a completed Subcontractor Report within the time specified in this section will be found to be not a responsible Bidder and may be required to forfeit the Bid security. The OWNER will then consider the next lowest Bidder for award of the contract.

END OF SECTION

SECTION 00500 - AGREEMENT

THIS AGREEMENT is between THE CITY & BOROUGH OF WRANGELL (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR) OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK.

CONTRACTOR shall complete the WORK as specified or as indicated under the Bid Schedule of the OWNER's Contract Documents entitled **Lift Station Generator Enclosure**. The WORK is generally described as follows:

Lift Station Generator Enclosure and install ER Generator.

A. Work under this Contract includes:

1. Sitework

a. Site utilities: Electrical

b. Rough and finish grading.

c. Miscellaneous site improvements.

2. Building Structure

a. Concrete footings and concrete foundation walls, concrete slabs on grade.

3. Building Enclosure

a. Exterior wall systems of board and batten fiber cement siding.

b. Galvanized chain link fence and louver.

c. Roofing systems of composite shingle.

4. Mechanical Systems

a. Ventilation: As needed for Electrical Standby Generator.

b. Temperature control system.

5. Electrical Systems

a. Electrical: As needed for Electrical Standby Generator.

6. Keep Architect fully informed about progress of the work, performance of the work and potential problems.

ARTICLE 2. CONTRACT COMPLETION TIME.

Substantial completion by _____.

ARTICLE 3. DATE OF AGREEMENT

The date of this Agreement will be the later of the date of the Borough Manager signature on page three of this section and the signature of the CONTRACTOR authorized representative.

SECTION 00500 - AGREEMENT

ARTICLE 4. LIQUIDATED DAMAGES.

OWNER and the CONTRACTOR recognize that time is of the essence of this Agreement and that the OWNER will suffer financial loss if the WORK is not completed within the time specified in Article 2 herein, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense, and difficulties involved in proving in a legal proceeding the actual damages suffered by the OWNER if the WORK is not completed on time. Accordingly, instead of requiring any such proof, the OWNER and the CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) the CONTRACTOR shall pay the OWNER \$_____ for each Calendar Day that expires after the substantial completion time specified in Article 2 above. The amount of liquidated damages specified above is agreed to be a reasonable estimate based on all facts known as of the date of this Agreement.

ARTICLE 5. CONTRACT PRICE.

OWNER shall pay CONTRACTOR for completion of the WORK in accordance with the Contract Documents in the amount set forth in the Bid Schedule. The CONTRACTOR agrees to accept as full and complete payment for all WORK to be done in this contract for: _____ those Unit Price amounts as set forth in the Bid Schedule in the Contract Documents for this Project.

The total amount of this contract shall be _____, except as adjusted in accordance with the provisions of the Contract Documents.

ARTICLE 6. PAYMENT PROCEDURES.

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by the ENGINEER as provided in the General Conditions.

Progress payments will be paid in full in accordance with Article 14 of the General Conditions until ninety (90) percent of the Contract Price has been paid. The remaining ten (10) percent of the Contract Price may be retained, in accordance with applicable Alaska State Statutes, until final inspection, completion, and acceptance of the Project by the OWNER.

ARTICLE 7. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire Agreement between OWNER and CONTRACTOR concerning the WORK consist of this Agreement (pages 00500-1 to 00500-6, inclusive) and the following sections of the Contract Documents:

- Table of Contents
- Notice Inviting Bids
- Instructions to Bidders
- Bid
- Bid Schedule
- Bid Bond
- Subcontractor Report
- Performance Bond
- Payment Bond
- Insurance Certificate(s)

SECTION 00500 - AGREEMENT

- General Conditions
- Supplementary General Conditions
- Alaska Labor Standards, Reporting, and Prevailing Wage Determination
- Permits
- Technical Specifications as listed in the Table of Contents
- _____ Drawings consisting of ____ sheets, as listed in the Table of Contents
- _____ Drawings consisting of ____ sheets, as listed in the Table of Contents
- Addenda numbers ____ to ____, inclusive.
- Change Orders which may be delivered or issued after the Date of the Agreement and which are not attached hereto

There are no Contract Documents other than those listed in this Article 7. The Contract Documents may only be amended by Change Order as provided in Paragraph 3.3 of the General Conditions.

ARTICLE 8. MISCELLANEOUS.

Terms used in this Agreement, which are defined in Article 1 of the General Conditions, will have the meanings indicated in the General Conditions.

No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation monies that may become due and monies that are due may not be assigned without such written consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents. CONTRACTOR understands and agrees that the Borough will not accept any assignment of this Contract to an LLC unless all the members of the LLC sign as guarantors of performance of this Contract.

OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents. This Agreement shall be governed by the laws of the State of Alaska. The Superior Court for the State of Alaska, First Judicial District at Wrangell, Alaska, shall be the exclusive jurisdiction and venue for any action of any kind an any nature arising out of or relating to this Agreement and all Contract documents or for any action of any kind and any nature arising out of or related to the performance of non-performance of the CONTRACTOR, and CONTRACTOR'S employees, subcontractors, consultants and representatives.

The CONTRACTOR acknowledges that the CONTRACTOR has read and understands the terms of this Agreement and the terms and conditions of all the Contract documents listed in this Agreement and has had the opportunity to review the Agreement with counsel of his/her choice, and is executing this Agreement of his/her own free will. CONTRACTOR acknowledges and agrees that CONTRACTOR is not relying on any representations by any Borough employee, the Mayor, an assembly member, the borough attorney, the borough manager or any consultant of the Borough in deciding to enter this Agreement and perform this project.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have caused this Agreement to be executed on the date listed below by OWNER.

SECTION 00500 - AGREEMENT

OWNER:

CONTRACTOR:

City & Borough of Wrangell

(Company Name)

(Signature)

(Signature)

By: Jeff Good, Borough Manager
(Printed Name)

By: _____
(Printed Name, Authority or Title)

Date: _____

Date: _____

Address: P.O. Box 531

Address: _____

Wrangell, Alaska 99929

907-874-2381 907-874-3952
(Telephone) (Fax)

(Telephone) (Fax)

(E-mail address)

Owner Attest:

Contractor Attest:

By: _____
Kim Lane, Borough Clerk

By: _____
Name/Title:

Approved as to Form:

By: _____
Joe Levesque
Attorney for the City and Borough of Wrangell

Date: _____

Approved:

By: _____
Steve Prysunka, Borough Mayor

Date: _____

SECTION 00500 - AGREEMENT

**CERTIFICATE
(if Corporation)**

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Board of Directors of the
_____ a corporation existing under the laws of
the State of _____, held on _____, 20____, the following resolution
was duly passed and adopted:

“RESOLVED, that _____, as _____ President
of the Corporation, be and is hereby authorized to **execute the Agreement** with OWNER and this
corporation and that the execution thereof, attested by the Secretary of the Corporation, and with
the Corporate Seal affixed, shall be the official act and deed of this Corporation.”

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the
Corporation this _____ day of _____, 20_____.

Secretary

(SEAL)

SECTION 00500 - AGREEMENT

CERTIFICATE
(if Partnership)

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Partners of the _____ a partnership existing under the laws of the State of _____, held on _____, 20____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Partnership, be and is hereby authorized to **execute the Agreement** with the OWNER and this partnership and that the execution thereof, attested by the _____ shall be the official act and deed of this Partnership."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20_____.

Secretary

(SEAL)

SECTION 00500 - AGREEMENT

**CERTIFICATE
(if Joint Venture)**

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Principals of the

_____ a joint venture existing under the laws of the

State of _____, held on _____, 20____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Joint Venture, be and is hereby authorized to **execute the Agreement** with the OWNER and this joint venture and that the execution thereof, attested by the _____ shall be the official act and deed of this Joint Venture."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20____.

Secretary

(SEAL)

SECTION 00500 - AGREEMENT

CERTIFICATE
(If Limited Liability Company)

STATE OF)
) SS:
COUNTY OF)

I HEREBY CERTIFY that a meeting of the members of the

_____, a Limited Liability Company (LLC) existing under the laws of the State of _____, held on _____, 20____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, acting as _____ of the Limited Liability Company, is hereby authorized by all Members to **execute the Agreement** with the OWNER and this Limited Liability Company and that the execution thereof, attested by the _____ shall be the official act and deed of this Limited liability Company."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20____.

Secretary

(SEAL)

By: _____
(Signature of authorized Member)

(Title of person signing)

END OF SECTION

SECTION 00610 - PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: That we _____
(Name of Contractor)

_____ a _____
(Corporation, Partnership, Individual)

hereinafter called "Principal" and _____
(Surety)

of _____, State of _____ hereinafter called the "Surety," are held and
firmly bound to the CITY & BOROUGH of WRANGELL, ALASKA hereinafter called "OWNER,"
(Owner) (City and State)

for the penal sum of _____

_____ dollars (\$ _____) in lawful money of the
United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs,
executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the CONTRACTOR has
entered into a certain contract with the OWNER, the effective date of which is
_____, a copy of which is hereto attached and made a part hereof for the
construction of:

Lift Station Generator Enclosure

NOW, THEREFORE, if the Principal shall truly and faithfully perform its duties, all the
undertakings, covenants, terms, conditions, and agreements of said contract during the original term
thereof, and any extensions thereof, which may be granted by the OWNER, with or without notice to the
Surety, and if it shall satisfy all claims and demands incurred under such contract, and shall fully
indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of
failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER
may incur in making good any default, then this obligation shall be void; otherwise to remain in full force
and effect.

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

PROVIDED, FURTHER, that no final settlement between the OWNER and the Principal shall
abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is issued in two (2) identical counterparts, each one of
which shall be deemed an original.

SECTION 00610 - PERFORMANCE BOND

CONTRACTOR:

By: _____
(Signature)

(Printed Name)

(Company Name)

(Street or P.O. Box)

(City, State, Zip Code)

SURETY:

By: _____
(Signature of Attorney-in-Fact)

Date Issued: _____

(Printed Name)

(Company Name)

(Street or P.O. Box)

(City, State, Zip Code)

(Affix SURETY'S SEAL)

NOTE: If CONTRACTOR is Partnership, all Partners must execute bond.

END OF SECTION

SECTION 00620 - PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: That we _____
(Name of Contractor)

_____ a _____
(Corporation, Partnership, Individual)

hereinafter called "Principal" and _____
(Surety)

of _____, State of _____ hereinafter called the "Surety," are held and
firmly bound to the CITY & BOROUGH of WRANGELL, ALASKA hereinafter called "OWNER,"
(Owner) (City and State)

for the penal sum of _____

_____ dollars (\$ _____) in lawful money of the
United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs,
executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the CONTRACTOR has
entered into a certain contract with the OWNER, the effective date of which is
_____, a copy of which is hereto attached and made a part hereof for the
construction of:

Lift Station Generator Enclosure

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms,
Subcontractors, and corporations furnishing materials for, or performing labor in the prosecution of the
WORK provided for in such contract, and any authorized extension or modification thereof, including all
amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and
tools, consumed or used in connection with the construction of such WORK, and all insurance premiums
on said work, and for all labor performed in such WORK, whether by Subcontractor or otherwise, then
this obligation shall be void; otherwise to remain in full force and effect.

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

PROVIDED, FURTHER, that no final settlement between the OWNER and the Principal shall
abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

SECTION 00620 - PAYMENT BOND

IN WITNESS WHEREOF, this instrument is issued in two (2) identical counterparts, each one of which shall be deemed an original.

CONTRACTOR:

By: _____
(Signature)

(Printed Name)

(Company Name)

(Street or P.O. Box)

(City, State, Zip Code)

SURETY:

By: _____
(Signature of Attorney-in-Fact)

Date Issued: _____

(Printed Name)

(Company Name)

(Street or P.O. Box)

(City, State, Zip Code)

(Affix SURETY'S SEAL)

NOTE: If CONTRACTOR is Partnership, all Partners must execute bond.

END OF SECTION

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Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof. Where an entire word is capitalized in the definitions and is found not capitalized in the Contract Documents it has the ordinary dictionary definition.

Addenda - Written or graphic instruments issued prior to the opening of Bids which make additions, deletions, or revisions to the Contract Documents.

Agreement - The written contract between the OWNER and the CONTRACTOR covering the WORK to be performed; other documents are attached to the Agreement and made a part thereof as listed out in the Agreement.

Application for Payment - The form furnished by the ENGINEER which is to be used by the CONTRACTOR to request progress or final payment and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

Asbestos - Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

Bid - The offer or proposal of the Bidder submitted on the prescribed form setting forth the price or prices for the WORK.

Bonds - Bid, Performance, and Payment Bonds and other instruments which protect against loss due to inability or refusal of the CONTRACTOR to perform its contract.

Project Manager - The authorized representative of the City and Borough of Wrangell, as OWNER, who is responsible for administration of the contract.

Change Order - A document recommended by the ENGINEER, which is signed by the CONTRACTOR and the OWNER and authorizes an addition, deletion, or revision in the WORK, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.

Contract Documents - The Table of Contents, Notice Inviting Bids, Instructions to Bidders, Bid Forms (including the Bid, Bid Schedule(s), Information Required of Bidder, Bid Bond, and all required certificates and affidavits), Agreement, Performance Bond, Payment Bond, General Conditions, Supplementary General Conditions, Technical Specifications, Drawings, Permits, and all Addenda, and Change Orders executed pursuant to the provisions of the Contract Documents.

Contract Price - The total monies payable by the OWNER to the CONTRACTOR under the terms and conditions of the Contract Documents.

Contract Time - The number of successive calendar days stated in the Contract Documents for the completion of the WORK.

CONTRACTOR - The individual, partnership, corporation, joint-venture or other legal entity with whom the OWNER has executed the Agreement.

Day - A calendar day of 24 hours measured from midnight to the next midnight.

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Defective WORK - WORK that is unsatisfactory, faulty, or deficient; or that does not conform to the Contract Documents; or that does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents; or WORK that has been damaged prior to the ENGINEER's recommendation of final payment.

Drawings - The Drawings, plans, maps, profiles, diagrams, and other graphic representations which indicate the character, location, nature, extent, and scope of the WORK and which have been prepared by the ENGINEER and are referred to in the Contract Documents. Shop Drawings are not within the meaning of this paragraph.

Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

Engineer of Record - The individual, partnership, corporation, joint-venture or other legal entity named as such in the Contract Documents.

ENGINEER - The ENGINEER is the firm or person(s) selected by the OWNER to perform the duties of project inspection and management. Wrangell will inform the CONTRACTOR of the identity of the ENGINEER at or before the Notice to Proceed.

Field Order - A written order issued by the ENGINEER which may or may not involve a change in the WORK.

General Requirements - Division 1 of the Technical Specifications.

Hazardous Waste - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 9603) as amended from time to time.

Holidays - Legal holidays occur on:

1. New Year's Day - January 1
2. Martin Luther King's Birthday - Third Monday in January
3. President's Day - Third Monday in February
4. Seward's Day - Last Monday in March
5. Memorial Day - Last Monday in May
6. Independence Day - July 4
7. Labor Day - First Monday in September
8. Alaska Day - October 18
9. Veteran's Day - November 11
10. Thanksgiving Day - Fourth Thursday and the following Friday in November
11. Christmas Day - December 25

If any holiday listed above falls on a Saturday, Saturday and the preceding Friday are both legal holidays. If the holiday should fall on a Sunday, Sunday and the following Monday are both legal holidays.

Inspector - The authorized representative of the ENGINEER assigned to make detailed inspections for conformance to the Contract Documents. Any reference to the Resident Project Representative in this document shall mean the Inspector.

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Laws and Regulations; Laws or Regulations - Any and all applicable laws, rules, regulations, ordinances, codes, and/or orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

Mechanic's Lien - A form of security, an interest in real property, which is held to secure the payment of an obligation. When referred to in these Contract Documents, "Mechanic's Lien" or "lien" means "Stop Notice".

Milestone - A principal event specified in the Contract Documents relating to an intermediate completion date of a portion of the WORK, or a period of time within which the portion of the WORK should be performed prior to Substantial Completion of all the WORK.

Notice of Intent to Award - The written notice by the OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the requirements listed therein, within the time specified, the OWNER will enter into an Agreement.

Notice of Award - The written notice by the OWNER to the apparent successful bidder stating that the apparent successful bidder has complied with all conditions for award of the contract.

Notice of Substantial Completion - A form signed by the ENGINEER and the CONTRACTOR recommending to the OWNER that the WORK is Substantially Complete and fixing the date of Substantial Completion. After acceptance of the WORK by the OWNER's governing body, the form is signed by the OWNER and filed with the County Recorder. This filing starts the 30 day lien filing period on the WORK.

Notice to Proceed - The written notice issued by the OWNER to the CONTRACTOR authorizing the CONTRACTOR to proceed with the WORK and establishing the date of commencement of the Contract Time.

OWNER - The City and Borough of Wrangell, acting through its legally designated officials, officers, or employees.

Partial Utilization - Use by the OWNER or a substantially completed part of the WORK for the purpose for which it is intended prior to Substantial Completion of all the WORK.

PCB's - Polychlorinated biphenyls.

PERMITTEE - CONTRACTOR.

Petroleum - Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

Project - The total construction of which the WORK to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

Radioactive Material - Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

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Shop Drawings - All Drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the CONTRACTOR and submitted by the CONTRACTOR, to the ENGINEER, to illustrate some portion of WORK.

Specifications - (Same definition as for Technical Specifications hereinafter).

Stop Notice - A legal remedy for Subcontractors and suppliers who contribute to public works, but who are not paid for their WORK, which secures payment from construction funds possessed by the OWNER. For public property, the Stop Notice remedy is designed to substitute for mechanic's lien rights.

Sub-Consultant - The individual, partnership, corporation, joint-venture or other legal entity having a direct contract with ENGINEER, or with any of its Consultants to furnish services with respect to the Project.

Subcontractor - An individual, partnership, corporation, joint-venture or other legal entity having a direct contract with the CONTRACTOR, or with any of its Subcontractors, for the performance of a part of the WORK at the site.

Substantial Completion - Refers to when the WORK has progressed to the point where, in the opinion of the ENGINEER as evidenced by Notice of Completion as applicable, it is sufficiently complete, in accordance with the Contract Documents, so that the WORK can be utilized for the purposes for which it is intended; or if no such notice is issued, when final payment is due in accordance with Paragraph 14.8. The terms "substantially complete" and "substantially completed" as applied to any WORK refer to substantial completion thereof.

Supplementary General Conditions (SGC) - The part of the Contract Documents which make additions, deletions, or revisions to these General Conditions.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman, or vendor.

Technical Specifications - Divisions 1 through 16 of the Contract Documents consisting of the General Requirements and written technical descriptions of products and execution of the WORK.

Underground Utilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: water, sewage and drainage removal, electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, traffic, or other control systems.

WORK - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. WORK is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

ARTICLE 2 PRELIMINARY MATTERS

2.1 DELIVERY OF BONDS/INSURANCE CERTIFICATES. When the CONTRACTOR delivers the signed Agreements to the OWNER, the CONTRACTOR shall also deliver to the OWNER such Bonds and Insurance Policies and Certificates as the CONTRACTOR may be required to furnish in accordance with the Contract Documents.

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- 2.2 COPIES OF DOCUMENTS. The OWNER shall furnish to the CONTRACTOR the required number of copies of the Contract Documents specified in the Supplementary General Conditions.
- 2.3 COMMENCEMENT OF CONTRACT TIME; NOTICE TO PROCEED. The Contract Time will start to run on the commencement date stated in the Notice to Proceed.
- 2.4 STARTING THE WORK
- A. The CONTRACTOR shall begin to perform the WORK within 10 days after the commencement date stated in the Notice to Proceed, but no WORK shall be done at the site prior to the commencement date, including mobilization.
- B. Before undertaking each part of the WORK, the CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. The CONTRACTOR shall promptly report in writing to the ENGINEER any conflict, error, or discrepancy which the CONTRACTOR may discover and shall obtain a written interpretation or clarification from the ENGINEER before proceeding with any WORK affected thereby.
- C. The CONTRACTOR shall submit to the ENGINEER for review those documents called for under Section 01300 - Contractor Submittals in the General Requirements.
- 2.5 PRE-CONSTRUCTION CONFERENCE. The CONTRACTOR is required to attend a Pre-Construction Conference. This conference will be attended by the ENGINEER and others as appropriate in order to discuss the WORK in accordance with the applicable procedures specified in the General Requirements, Section 01010 - Summary of Work in the General Requirements.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 INTENT

- A. The Contract Documents comprise the entire Agreement between the OWNER and the CONTRACTOR concerning the WORK. The Contract Documents shall be construed as a whole in accordance with Alaska Law.
- B. It is the intent of the Contract Documents to describe the WORK, functionally complete, to be constructed in accordance with the Contract Documents. Any work, materials, or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe work, materials, or equipment such words or phrases shall be interpreted in accordance with that meaning, unless a definition has been provided in Article 1 of the General Conditions. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the OWNER, the CONTRACTOR, or the ENGINEER or any of their consultants, agents, or employees from those set forth in the Contract Documents.

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- C. If, during the performance of the WORK, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the WORK or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, the CONTRACTOR shall report it to the ENGINEER in writing at once, and the CONTRACTOR shall not proceed with the WORK affected thereby (except in an emergency as authorized by the ENGINEER) until a clarification field order, or Change Order to the Contract Documents has been issued.

3.2 ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS

- A. In resolving conflicts resulting from, errors, or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

1. Permits from other agencies as may be required by law, excepting the definition of "PERMITEE" in these permits.
2. Field Orders
3. Change Orders
4. ENGINEER's written interpretations and clarifications.
5. Agreement
6. Addenda
7. CONTRACTOR's Bid (Bid Form)
8. Supplementary General Conditions
9. Notice Inviting Bids
10. Instructions to Bidders
11. General Conditions
12. Technical Specifications
13. Drawings

- B. With reference to the Drawings the order of precedence is as follows:

1. Figures govern over scaled dimensions
2. Detail Drawings govern over general Drawings
3. Addenda/ Change Order drawings govern over Contract Drawings
4. Contract Drawings govern over standard drawings

- 3.3 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS. The Contract Documents may be amended to provide for additions, deletions, and revisions in the WORK or to modify the terms and conditions thereof by a Change Order (pursuant to Article 10 CHANGES IN THE WORK).

- 3.4 REUSE OF DOCUMENTS. Neither the CONTRACTOR, nor any Subcontractor or Supplier, nor any other person or organization performing any of the WORK under a contract with the OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Technical Specifications, or other documents used on the WORK, and they shall not reuse any of them on the extensions of the Project or any other project without written consent of the OWNER.

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ARTICLE 4 AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 AVAILABILITY OF LANDS. The OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the WORK is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the OWNER, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or rights-of-way provided. The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment; provided, that the CONTRACTOR shall not enter upon nor use any property not under the control of the OWNER until a written temporary construction easement, lease or other appropriate agreement has been executed by the CONTRACTOR and the property owner, and a copy of said agreement furnished to the ENGINEER prior to said use; and, neither the OWNER nor the ENGINEER shall be liable for any claims or damages resulting from the CONTRACTOR's unauthorized trespass or use of any such properties.

4.2 PHYSICAL CONDITIONS - SUBSURFACE AND EXISTING STRUCTURES

- A. Explorations and Reports. Reference is made to SGC 4.2 Physical Conditions of the Supplementary General Conditions for identification of those reports of explorations and tests of sub-surface conditions at the site that have been utilized by the ENGINEER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such reports, however, reports are not to be considered complete or comprehensive and nontechnical data, interpretations, and opinions contained in such reports shall be verified by the CONTRACTOR prior to bid. The CONTRACTOR is responsible for any further explorations or tests that may be necessary and any interpretation, interpolation, or extrapolation that it makes of any information shown in such reports.
- B. Existing Structures. Reference is made to SGC 4.2 Physical Conditions of the Supplementary General Conditions for identification of those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Utilities referred to in Paragraph 4.4 herein) which are at or contiguous to the site that have been utilized by the ENGINEER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings, however, nontechnical data, interpretations, and opinions contained in such drawings shall be verified by the CONTRACTOR prior to bid. The CONTRACTOR is also responsible for any interpretation, interpolation, or extrapolation that it makes of any information shown in such drawings.

4.3 DIFFERING SITE CONDITIONS

- A. The CONTRACTOR shall promptly upon discovery (but in no event later than 14 days thereafter) and before the following conditions are disturbed, notify the ENGINEER, in writing of any:
1. Material that the CONTRACTOR believes may be material that is hazardous waste, as defined in Article 1 of these General Conditions, or asbestos, PCB's, petroleum or any other substance or material posing a threat to human or to the environment.

SECTION 00700 - GENERAL CONDITIONS

2. Subsurface or latent physical conditions at the site differing from those indicated in the reports referenced in SGC 4.2 Physical Conditions.
 3. Unknown physical conditions at the site of any unusual nature, differing materially from those physical conditions ordinarily encountered in the area of project and generally recognized as inherent in the area of the project and as ordinarily encountered and inherent in WORK of the character provided for in the contract. Weather conditions specifically do not constitute any change condition under this section.
- B. The OWNER shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the CONTRACTOR's cost of, or the time required for, performance of any part of the WORK shall issue a Change Order under the procedures described in the contract.
- C. In the event that a dispute arises between the OWNER and the CONTRACTOR whether the conditions materially differ, or involved hazardous waste or other materials listed above, or cause a decrease or increase in the CONTRACTOR's cost of, or time required for, performance of any part of the WORK, the 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. The CONTRACTOR and OWNER shall retain any and all rights provided either by contract or by Law which pertain to the resolution of disputes and protests between the contracting parties.

4.4 PHYSICAL CONDITIONS - UNDERGROUND UTILITIES

- A. Indicated. The information and data indicated in the Contract Documents with respect to existing Underground Utilities at or contiguous to the site are based on information and data furnished to the OWNER or the ENGINEER by the owners of such Underground Utilities or by others. Unless it is expressly provided in the Supplementary General Conditions and/or Section 01530 - Protection and Restoration of Existing Facilities of the General Requirements, the OWNER and the ENGINEER shall not be responsible for the accuracy or completeness of any such information or data, and the CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Utilities indicated in the Contract Documents, for coordination of the WORK with the owners of such Underground Utilities during construction, for the safety and protection thereof and repairing any damage thereto resulting from the WORK, the cost of which will be considered as having been included in the Contract Price.
- B. Not Indicated. If an Underground Utility is uncovered or revealed at or contiguous to the site which was not indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall identify the owner of such Underground Utility and give written notice thereof to that owner and shall notify the ENGINEER in accordance with the requirements of the Supplementary General Conditions and Section 01530 - Protection and Restoration of Existing Facilities of the General Requirements.

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4.5 REFERENCE POINTS

- A. The ENGINEER will provide one benchmark, near or on the site of the WORK, and will provide two points near or on the site to establish a base line for use by the CONTRACTOR for alignment control. Unless otherwise specified in the General Requirements, the CONTRACTOR shall furnish all other lines, grades, and benchmarks required for proper execution of the WORK.
- B. The CONTRACTOR shall preserve all bench marks, stakes, and other survey marks, and in case of their removal or destruction by its own employees or by its Subcontractor's employees, the CONTRACTOR shall be responsible for the accurate replacement of such reference points by personnel qualified under the Alaska Statute governing the licensing of Architects, Engineers, and Land Surveyors.

ARTICLE 5 BONDS AND INSURANCE

5.1 PERFORMANCE, PAYMENT, AND OTHER BONDS

- A. The CONTRACTOR shall furnish, when required, Performance and Payment Bonds on forms provided by the OWNER for the penal sums of 100% of the amount of the Bid award. The surety on each bond may be any corporation or partnership authorized to do business in the State of Alaska as an insurer under AS 21.09. These bonds shall remain in effect for 12 months after the date of final payment and until all obligations and liens under this contract have been satisfied. The CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary General Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.
- B. If the surety on any Bond furnished by the CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the WORK is located, the CONTRACTOR shall within 7 days thereafter substitute another Bond and Surety, which must be acceptable to the OWNER.
- C. All Bonds required by the Contract Documents to be purchased and maintained by CONTRACTOR shall be obtained from surety companies that are duly licensed or authorized in the State of Alaska to issue Bonds for the limits so required. Such surety companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary General Conditions. The City Manager may, on behalf of the OWNER, notify the surety of any potential default or liability.

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5.2 INSURANCE

- A. The CONTRACTOR shall purchase and maintain the insurance required under this paragraph. Such insurance shall include the specific coverages set out herein and be written for not less than the limits of liability and coverages provided in the Supplementary General Conditions, or required by law, whichever are greater. All insurance shall be maintained continuously during the life of the Agreement up to the date of Final Completion and at all times thereafter when the CONTRACTOR may be correcting, removing, or replacing Defective WORK in accordance with Paragraph 13.6, but the CONTRACTOR's liabilities under this Agreement shall not be deemed limited in any way to the insurance coverage required.
- B. All insurance required by the Contract Documents to be purchased and maintained by the CONTRACTOR shall be obtained from insurance companies that are duly licensed or authorized in the State of Alaska to issue insurance policies for the limits and coverages so required. Such insurance companies shall have a current Best's Rating of at least an "A" (Excellent) general policy holder's rating and a Class VII financial size category and shall also meet such additional requirements and qualifications as may be provided in the Supplementary General Conditions.
- C. The City and Borough of Wrangell shall be listed as an additional insured on the CONTRACTOR'S general liability insurance policy and the CONTRACTOR'S pollution liability policy. CONTRACTOR shall furnish certificates to the Borough of such insurance and showing the Borough as an additional insured within ten days of receiving the Notice to Proceed. Failure to comply with this provision constitutes a material breach and default of the Agreement.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

6.1 SUPERVISION AND SUPERINTENDENCE

- A. The CONTRACTOR shall supervise, inspect, and direct the WORK competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the WORK in accordance with the Contract Documents. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incidental thereto. The CONTRACTOR shall be responsible to see that the completed WORK complies accurately with the Contract Documents.
- B. The CONTRACTOR shall designate in writing and keep on the WORK site at all times during its progress a technically qualified, English-speaking superintendent, who is an employee of the CONTRACTOR and who shall not be replaced without written notice to the OWNER and the ENGINEER. The superintendent will be the CONTRACTOR's representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the superintendent shall be as binding as if given to the CONTRACTOR. The CONTRACTOR shall issue all its communications to the OWNER through the ENGINEER and the ENGINEER only.
- C. The CONTRACTOR's superintendent shall be present at the site of the WORK at all times while WORK is in progress. Failure to observe this requirement shall be considered suspension of the WORK by the CONTRACTOR until such time as such superintendent is again present at the site.

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6.2 LABOR, MATERIALS, AND EQUIPMENT

- A. The CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the WORK and perform construction as required by the Contract Documents. The CONTRACTOR shall furnish, erect, maintain, and remove the construction plant and any temporary works as may be required. The CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the WORK or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all WORK at the site shall be performed during regular working hours, and the CONTRACTOR will not permit overtime work or the performance of work on Saturday, Sunday, or any legal holiday without the OWNER's written consent. The CONTRACTOR shall apply for this consent through the ENGINEER.
- B. Except as otherwise provided in this Paragraph, the CONTRACTOR shall receive no additional compensation for overtime work, i.e., work in excess of 8 hours in any one calendar day or 40 hours in any one calendar week, even though such overtime work may be required under emergency conditions and may be ordered by the ENGINEER in writing. Additional compensation will be paid the CONTRACTOR for overtime work only in the event extra work is ordered by the ENGINEER and the Change Order specifically authorizes the use of overtime work and then only to such extent as overtime wages are regularly being paid by the CONTRACTOR for overtime work of a similar nature in the same locality.
- C. All costs of inspection and testing performed during overtime work by the CONTRACTOR which is allowed solely for the convenience of the CONTRACTOR shall be borne by the CONTRACTOR. The OWNER shall have the authority to deduct the cost of all such inspection and testing from any partial payments otherwise due to the CONTRACTOR.
- D. Unless otherwise specified in the Contract Documents, the CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the WORK, including all mobilization and demobilization.
- E. All materials and equipment to be incorporated into the WORK shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of the OWNER. If required by the ENGINEER, the CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provisions of any such instructions will be effective to assign to the ENGINEER, or any of the ENGINEER consultants, agents, or employees, any duty or authority to supervise or direct the furnishing or performance of the WORK or any duty or authority to undertake responsibility contrary to the provisions of Paragraphs 9.9C and 9.9D.

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- F. The CONTRACTOR shall at all times employ sufficient labor and equipment for prosecuting the several classes of WORK to full completion in the manner and time set forth in and required by these specifications. All workers shall have sufficient skill and experience to perform properly the WORK assigned to them. Workers engaged in special WORK, or skilled WORK, shall have sufficient experience in such WORK and in the operation of the equipment required to perform all WORK, properly and satisfactorily.
- G. Any person employed by the CONTRACTOR or by any Subcontractor who, in the opinion of the ENGINEER, does not perform the WORK in a proper and skillful manner, or is intemperate or disorderly shall, at the written request of the ENGINEER, be removed forthwith by the CONTRACTOR or Subcontractor employing such person, and shall not be employed again in any portion of the WORK without the approval of the ENGINEER. Should the CONTRACTOR fail to remove such person or persons as required above, or fail to furnish suitable and sufficient personnel for the proper prosecution of the WORK, the ENGINEER may suspend the WORK by written notice until such orders are complied with.
- 6.3 ADJUSTING PROGRESS SCHEDULE. The CONTRACTOR shall submit monthly updates of the progress schedule to the ENGINEER for acceptance in accordance with the provisions in Section 01300 - Contractor Submittals in the General Requirements.
- 6.4 SUBSTITUTES OR "OR-EQUAL" ITEMS. The CONTRACTOR shall submit proposed substitutes or "or-equal" items in accordance with the provisions in Section 01300 - Contractor Submittals in the General Requirements.
- 6.5 CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS.
- A. The CONTRACTOR shall be responsible to the OWNER and the ENGINEER for the acts and omissions of its Subcontractors and their employees to the same extent as CONTRACTOR is responsible for the acts and omissions of its own employees. Nothing contained in this Paragraph shall create any contractual relationship between any Subcontractor and the OWNER or the ENGINEER nor relieve the CONTRACTOR of any liability or obligation under the Agreement and Contract documents.
- B. The CONTRACTOR shall perform not less than 40% of the WORK with its own forces (i.e., without subcontracting). The 40% requirement shall be understood to mean that the CONTRACTOR shall perform, with its own organization, WORK amounting to at least 40% of the awarded contract amount. The 40% requirement will be calculated based upon the total of the subcontract amounts submitted for contract award, and any other information requested by the OWNER from the apparent low bidder.
- 6.6 PERMITS
- A. Unless otherwise provided in the Supplementary General Conditions, the CONTRACTOR shall obtain and pay for all construction permits and licenses from the agencies having jurisdiction, including the furnishing of insurance and bonds if required by such agencies. The enforcement of such requirements under this contract shall not be made the basis for claims for additional compensation. The OWNER shall assist the CONTRACTOR, when necessary, in obtaining such permits and licenses. The CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the WORK, which are applicable at the time of opening of Bids. The CONTRACTOR shall pay all charges of utility owners for connections to the WORK.

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- B. These Contract Documents may require that the WORK be performed within the conditions and/or requirements of local, state and/or federal permits. These permits may be bound within the Contract Documents, included within the Contract Documents by reference, or included as part of the WORK, as designated in this Section. The CONTRACTOR is responsible for completing the WORK required for compliance with all permit requirements; this WORK is incidental to other items in the Contract Documents. Any reference to the “permittee” in the permits shall mean the CONTRACTOR. If any permits were acquired by the OWNER, this action was done to expedite the start of construction. If the CONTRACTOR does not complete the WORK within the specified permit window, the CONTRACTOR shall be responsible for the permit extension, and for completing any additional requirements placed upon the permit.
- C. These Contract Documents may require that the WORK be performed within the conditions and/or requirements of local, state and/or federal permits. These permits may be bound within the Contract Documents, included within the Contract Documents by reference, or included as part of the WORK, as designated in Section 00700 – General Conditions, Article 6.6 - PERMITS. The CONTRACTOR is responsible for completing the WORK required for compliance with all permit requirements; this WORK is incidental to other items in the Contract Documents. Any reference to the “permittee” in the permits shall mean the CONTRACTOR. If any permits were acquired by the OWNER, this action was done to expedite the start of construction. If the CONTRACTOR does not complete the WORK within the specified permit window, the CONTRACTOR shall be responsible for the permit extension, and for completing any additional requirements placed upon the permit.
- D. The OWNER shall apply for, and obtain, the necessary building permit for this project, however, the CONTRACTOR is responsible for scheduling and coordinating all necessary inspections. All other provisions of this Section remain in effect.
- 6.7 PATENT FEES AND ROYALTIES. The CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the WORK or the incorporation in the WORK of any invention, design, process, product, software or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the WORK and if to the actual knowledge of the OWNER or the ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the OWNER in the Contract Documents. The CONTRACTOR shall indemnify, defend and hold harmless the OWNER and the ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses (including attorneys’ fees and court costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the WORK or resulting from the incorporation in the WORK of any invention, design, process, product, or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

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6.8 LAWS AND REGULATIONS. The CONTRACTOR shall observe and comply with all federal, state, and local laws, ordinances, codes, orders, and regulations which in any manner affect those engaged or employed on the WORK, the materials used in the WORK, or the conduct of the WORK. If any discrepancy or inconsistency should be discovered in this contract in relation to any such law, ordinance, code, order, or regulation, the CONTRACTOR shall report the same in writing to the ENGINEER. The CONTRACTOR shall indemnify, defend, and hold harmless the OWNER, the ENGINEER, and their officers, agents, and employees against all claims or liability arising from violation of any such law, ordinance, code, order, or regulation, whether by CONTRACTOR or by its employees, Subcontractors, or third parties. Any particular law or regulation specified or referred to elsewhere in the Contract Documents shall not in any way limit the obligation of the CONTRACTOR to comply with all other provisions of federal, state, and local laws and regulations.

The OWNER may, per AS 36.30, audit the CONTRACTOR's or Subcontractor(s) records that are related to the cost or pricing data for this contract, all related Change Orders, and/or contract modifications.

6.9 TAXES. The CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by the CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the WORK.

6.10 USE OF PREMISES. The CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to (1) the Project site, (2) the land and areas identified in and permitted by the Contract Documents, and (3) the other land and areas permitted by Laws and Regulations, rights-of-way, permits, leases and easements. The CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the WORK. Should any claim be made against the OWNER or the ENGINEER by any such owner or occupant because of the performance of the WORK, the CONTRACTOR shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim through litigation. The CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify, defend, and hold the OWNER and the ENGINEER harmless from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers attorneys, and other professionals and court costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any such owner or occupant against the OWNER, the ENGINEER, their Consultants, Sub-consultants, and the officers, directors, employees and agents of each and any of them to the extent caused by or based upon the CONTRACTOR's performance or non-performance of the WORK.

6.11 SAFETY AND PROTECTION

A. The CONTRACTOR shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all employees on the WORK and other persons and organizations who may be affected thereby;
2. all the WORK and materials and equipment to be incorporated therein, whether in storage on or off the site; and

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3. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
- B. The CONTRACTOR shall comply with all applicable Laws and Regulations whether referred to herein or not) of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss and shall erect and maintain all necessary safeguards for such safety and protection. The CONTRACTOR shall notify owners of adjacent property and utilities when prosecution of the WORK may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. The CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and program.
- D. Materials that contain hazardous substances or mixtures may be required on the WORK. A Material Safety Data Sheet shall be requested by the CONTRACTOR from the manufacturer of any hazardous product used.
- E. Material usage shall be accomplished with strict adherence to all safety requirements and all manufacturer's warnings and application instructions listed on the Material Safety Data Sheet and on the product container label.
- F. The CONTRACTOR shall be responsible for coordinating communications on any exchange of Material Safety Data Sheets or other hazardous material information that is required to be made available to, or exchanged between, or among, employers at the site in accordance with Laws or Regulations.
- G. The CONTRACTOR shall notify the ENGINEER if it considers a specified product or its intended usage to be unsafe. This notification must be given to the ENGINEER prior to the product being ordered, or if provided by some other party, prior to the product being incorporated in the WORK.

6.12 SHOP DRAWINGS AND SAMPLES

- A. After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, the CONTRACTOR shall submit to the ENGINEER for review, all Shop Drawings in accordance with Section 01300 - Contractor Submittals in the General Requirements.
- B. The Contractor shall also submit to the ENGINEER for review all samples in accordance with Section 01300 - Contractor Submittals in the General Requirements.
- C. Before submittal of each shop drawing or sample, the CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the WORK and the Contract Documents.

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6.13 CONTINUING THE WORK. The CONTRACTOR shall carry on the WORK and adhere to the progress schedule during all disputes or disagreements with the OWNER. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as the CONTRACTOR and the OWNER may otherwise agree in writing.

6.14 INDEMNIFICATION

A. To the fullest extent permitted by the laws of the State of Alaska, the CONTRACTOR shall indemnify, defend, and hold harmless the OWNER, the ENGINEER, their Consultants, Sub-consultants and the officers, assembly members, mayor, directors, employees, and agents of each and any of them, against and from all claims, actions, damages, and liability of any kind and any nature arising out of or related to in way any acts or omissions of the CONTRACTOR, including death, and including in any administrative action by any federal or state agency, except where the claim or action alleges willful misconduct of the OWNER and the ENGINEER. Such indemnification by the CONTRACTOR shall include but not be limited to the following:

1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the CONTRACTOR, its employees, or agents in the performance of the WORK, or non-performance of the WORK, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the CONTRACTOR, its employees, agents, or third parties;
2. Liability or claims arising directly or indirectly from bodily injury, occupational sickness or disease, or death of the CONTRACTOR's or Subcontractor's own employees engaged in the WORK resulting in actions brought by or on behalf of such employees against the OWNER, and the ENGINEER;
3. Liability or claims arising directly or indirectly from or based on the violation of any federal, state or local law, ordinance, regulation, order, or decree, whether by the CONTRACTOR, its employees, or agents;
4. Liability or claims arising directly or indirectly from the use or manufacture by the CONTRACTOR, its employees, or agents in the performance of this contract of any copyrighted or non-copyrighted composition, secret process, patented or non-patented invention, computer software, article, or appliance, unless otherwise specifically stipulated in this contract.
5. Liability or claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the OWNER or any other parties by the CONTRACTOR, its employees, or agents;
6. Liabilities or claims arising directly or indirectly from the willful or criminal misconduct of the CONTRACTOR, its employees, or agents; and,
7. Liabilities or claims arising directly or indirectly from any breach of the obligations of the CONTRACTOR in the Agreement and all Contract documents.

B. The CONTRACTOR shall reimburse the ENGINEER and the OWNER for all costs and expenses, (including but not limited to fees and charges of engineers, attorneys, experts, and other professionals and court costs including all costs of appeals) incurred by the OWNER, and the ENGINEER in enforcing the provisions of this Paragraph 6.14.

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- C. The indemnification obligation under this Paragraph 6.14 shall not be limited in any way by any limitation of the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any such Subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- 6.15 **CONTRACTOR'S DAILY REPORTS.** The CONTRACTOR shall complete a daily report indicating total manpower for each construction trade, major equipment on site, each Subcontractor's manpower, weather conditions, etc., involved in the performance of the WORK. The daily report shall be completed on forms provided by the ENGINEER and shall be submitted to the ENGINEER at the conclusion of each workday. The report should comment on the daily progress and status of the WORK within each major component of the WORK. These components will be decided by the ENGINEER.
- 6.16 **ASSIGNMENT OF CONTRACT.** The CONTRACTOR shall not assign, sublet, sell, transfer, or otherwise dispose of the contract or any portion thereof, or its right, title, or interest therein, or obligations thereunder, without the written consent of the OWNER except as imposed by law. If the CONTRACTOR violates this provision, the contract may be terminated at the sole option of the OWNER. In such event, the OWNER shall be relieved of all liability and obligations to the CONTRACTOR and to its assignee or transferee, growing out of such termination.
- 6.17 **CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES.** It is understood that any turn-on or turn-off, line locates and any other work or assistance necessary by the OWNER, will be at the CONTRACTOR's expense unless otherwise stated in the bid documents. All cost must be agreed to prior to any related actions and will be considered incidental to the project cost. Billing to the CONTRACTOR will be direct from the OWNER.
- 6.18 **OPERATING WATER SYSTEM VALVES**
- A. The CONTRACTOR shall submit a written request, to the ENGINEER, for approval to operate any valve on any in-service section of the City water system. The request must be submitted at least 24-hours prior to operating any valves. The request shall specifically identify each valve to be operated, the time of operation, and the operation to be performed. The CONTRACTOR shall obtain the written approval of the ENGINEER for any scheduled operation before operating any valve.
- B. The CONTRACTOR shall be responsible for all damages, both direct and consequential, to the OWNER or any other party, caused by unauthorized operation of any valve of the City water system.
- 6.19 **CONTRACTOR'S WORK SCHEDULE LIMITATIONS.** City and Borough of Wrangell Noise Ordinance. The noise loudness measured at the boundary line of the premises used for industrial activities shall not exceed 90 decibels between the hours of 7:00 AM and 8:00 PM on weekdays and the hours of 10:00 AM and 8:00 PM on weekends and holidays, and 40 decibels at other hours, unless a permit shall first be obtained from the OWNER. Such permit shall be issued by the OWNER only upon a determination that such operation during hours not otherwise permitted hereunder is necessary and will not result in unreasonable disturbance to surrounding residents.

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ARTICLE 7 OTHER WORK

7.1 RELATED WORK AT SITE

- A. The OWNER may perform other work related to the Project at the site by the OWNER's own forces, have other work performed by utility owners, or let other direct contracts therefor which may contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to the CONTRACTOR prior to starting any such other work.
- B. The CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (or the OWNER, if the OWNER is performing the additional work with the OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the WORK with theirs. The CONTRACTOR shall do all cutting, fitting, and patching of the WORK that may be required to make its several parts come together properly and integrate with such other work. The CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of the ENGINEER and the others whose work will be affected.
- C. If the proper execution or results of any part of the CONTRACTOR's WORK depends upon the work of any such other contractor or utility owner (or OWNER), the CONTRACTOR shall inspect and report to the ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for such proper execution and results. The CONTRACTOR's failure to report such delays, defects, or deficiencies will constitute an acceptance of the other work as fit and proper for integration with the CONTRACTOR's WORK except for latent or nonapparent defects and deficiencies in the other work.

7.2 **COORDINATION.** If the OWNER contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Supplementary General Conditions, and the specific matters to be covered by such authority and responsibility will be itemized and the extent of such authority and responsibilities will be provided in the Supplementary General Conditions.

ARTICLE 8 OWNER'S RESPONSIBILITIES

8.1 COMMUNICATIONS

- A. The OWNER shall issue all its communications to the CONTRACTOR through the ENGINEER.
- B. The CONTRACTOR shall issue all its communications to the OWNER through the ENGINEER.

8.2 **PAYMENTS.** The OWNER shall make payments to the CONTRACTOR as provided in Paragraphs 14.5, 14.8, 14.9 and 14.10.

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- 8.3 LANDS, EASEMENTS, AND SURVEYS. The OWNER's duties in respect of providing lands and easements and providing surveys to establish reference points are set forth in Paragraphs 4.1 and 4.5.
- 8.4 CHANGE ORDERS. The OWNER shall execute Change Orders as indicated in Paragraph 10.1F.
- 8.5 INSPECTIONS AND TESTS. The OWNER's responsibility in respect of inspections, tests, and approvals is set forth in Paragraph 13.3.
- 8.6 SUSPENSION OF WORK. In connection with the OWNER's right to stop WORK or suspend WORK, see Paragraphs 13.4 and 15.1.
- 8.7 TERMINATION OF AGREEMENT. Paragraphs 15.2 and 15.3 detail the OWNER's right to terminate services of the CONTRACTOR.

ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION

- 9.1 OWNER'S REPRESENTATIVE. The ENGINEER will be the OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of the ENGINEER as the OWNER's representative during construction are set forth in the Contract Documents.
- 9.2 VISITS TO SITE. The ENGINEER will make visits to the site during construction to observe the progress and quality of the WORK and to determine, in general, if the WORK is proceeding in accordance with the Contract Documents. Exhaustive or continuous on-site inspections to check the quality or quantity of the WORK will not be required of the ENGINEER. The ENGINEER will not, during such visits, or as a result of such observations of the CONTRACTOR's WORK in progress, supervise, direct, or have control over the CONTRACTOR's WORK.
- 9.3 PROJECT REPRESENTATION. The ENGINEER may furnish an Inspector to assist in observing the performance of the WORK. The duties, responsibilities, and limitations of authority are as follows:

- A. Duties, Responsibilities and Limitations of Authority of Inspector

General. The Inspector, who is the ENGINEER's Agent, will act as directed by and under the supervision of the ENGINEER and will confer with the ENGINEER regarding its actions. The Inspector's dealings in matters pertaining to the on-site WORK shall, in general, be only with the ENGINEER and the CONTRACTOR, and dealings with Subcontractors shall only be through or with the full knowledge of the CONTRACTOR. Written communication with the OWNER will be only through or as directed by the ENGINEER.

Duties and Responsibilities. The Inspector will:

- 1. Review the progress schedule, list of Shop Drawing submittals and schedule of values prepared by the CONTRACTOR and consult with the ENGINEER concerning their acceptability.

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2. Attend pre-construction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with the ENGINEER and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.
3. Serve as the ENGINEER's liaison with the CONTRACTOR, working principally through the CONTRACTOR's superintendent and assist said superintendent in understanding the intent of the Contract Documents. Assist the ENGINEER in serving as the OWNER's liaison with the CONTRACTOR when the CONTRACTOR's operations affect the OWNER's on-site operations.
4. As requested by the ENGINEER, assist in obtaining from the OWNER additional details or information, when required at the site for proper execution of the WORK.
5. Receive and record date of receipt of Shop Drawings and samples, receive samples which are furnished at the site by the CONTRACTOR and notify the ENGINEER of their availability for examination.
6. Conduct on-site observations of the WORK in progress to assist the ENGINEER in determining if the WORK is proceeding in accordance with the Contract Documents.
7. Report to the ENGINEER whenever the Inspector believes that any WORK is unsatisfactory, faulty, or defective or does not conform to the Contract Documents, or does not meet the requirements of any inspection, tests or approval required to be made or has been damaged prior to final payment; and advise the ENGINEER when the Inspector believes WORK should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection, or approval.
8. Verify that the tests, equipment, and systems startups and operating and maintenance instruction are conducted as required by the Contract Documents and in presence of the required personnel, and that the CONTRACTOR maintains adequate records thereof; observe, record and report to the ENGINEER appropriate details relative to the test procedures and start-ups.
9. Accompany visiting inspectors representing public or other agencies having jurisdiction over the WORK, record the outcome of these inspections, and report to the ENGINEER.
10. Transmit to the CONTRACTOR the ENGINEER's clarifications and interpretations of the Contract Documents.
11. Consider and evaluate the CONTRACTOR's suggestions for modifications in the Contract Documents and report them with recommendations to the ENGINEER.
12. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and sample submittals, reproductions of original Contract Documents including all addenda, Change Orders, field orders, additional Drawings issued subsequent to the execution of the contract, the ENGINEER's clarifications and interpretations of the Contract Documents, progress reports, and other related documents.
13. Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions, list all project visitors, daily activities, decisions, observations in general, and specific observations in more detail as in the case of performing and observing test procedures. Send copies to the ENGINEER.
14. Record names, addresses, and telephone numbers of the CONTRACTOR, Subcontractors, and major suppliers of materials and equipment.
15. Furnish the ENGINEER with periodic reports as required of progress of the WORK and the CONTRACTOR's compliance with the accepted progress schedule and schedule of CONTRACTOR submittals.

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16. Consult with the ENGINEER in advance of scheduled major tests, inspections, or start of important phases of the WORK.
17. Report immediately to the ENGINEER upon the occurrence of any accident.
18. Review applications for payment with the CONTRACTOR for compliance with the established procedure for their submittal and forward them with recommendations to the ENGINEER, noting particularly their relation to the schedule of values, WORK completed, and materials and equipment delivered at the site but not incorporated in the WORK.
19. During the course of the WORK, verify that certificates, maintenance and operation manuals, and other data required to be assembled and furnished by the CONTRACTOR are applicable to the items actually installed; and deliver this material to the ENGINEER for its review and forwarding to the OWNER prior to final acceptance of the WORK.
20. Before the ENGINEER prepares a Certificate of Substantial Completion/Notice of completion, as applicable, review the CONTRACTOR's punch list items requiring completion or correction and add any items that CONTRACTOR has omitted.
21. Conduct final inspection in the company of the ENGINEER, the OWNER, and the CONTRACTOR, and prepare a final punch list of items to be completed or corrected.
22. Verify that all items on the punch list have been completed or corrected and make recommendations to the ENGINEER concerning acceptance.

Limitations of Authority. Except upon written instruction of the ENGINEER, the Inspector:

1. Shall not authorize any deviation from the Contract Documents or approve any substitute material or equipment.
2. Shall not exceed limitations on the ENGINEER's authority as set forth in the Contract Documents.
3. Shall not undertake any of the responsibilities of the CONTRACTOR, Subcontractors or CONTRACTOR's superintendent, or expedite the WORK.
4. Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences, or procedures of construction unless such is specifically called for in the Contract Documents.
5. Shall not advise on or issue directions as to safety precautions and programs in connection with the WORK.

9.4 CLARIFICATIONS AND INTERPRETATIONS. The ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as the ENGINEER may determine necessary, which shall be consistent with, or reasonably inferred from, the overall intent of the Contract Documents.

9.5 AUTHORIZED VARIATIONS IN WORK. The ENGINEER may authorize variations in the WORK from the requirements of the Contract Documents. These may be accomplished by a Field Order and will require the CONTRACTOR to perform the WORK involved in a manner that minimizes the impact to the WORK and the contract completion date. If the CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time, the CONTRACTOR may make a claim therefor as provided in Article 11 or 12.

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9.6 **REJECTING DEFECTIVE WORK.** The ENGINEER will have authority to reject WORK which the ENGINEER believes to be defective and will also have authority to require special inspection or testing of the WORK as provided in Paragraph 13.3G, whether or not the WORK is fabricated, installed, or completed.

9.7 **CONTRACTOR SUBMITTALS, CHANGE ORDERS, AND PAYMENTS**

- A. In accordance with the procedures set forth in the General Requirements, the ENGINEER will review all CONTRACTOR submittals, including Shop Drawings, samples, substitutes, or “or equal” items, etc., in order to determine if the items covered by the submittals will, after installation or incorporation in the WORK, conform to the requirements of the Contract Documents and be compatible with the design concept of the completed project as a functioning whole as indicated by the Contract Documents. The ENGINEER’s review will not extend to means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto.
- B. In connection with the ENGINEER’s responsibilities as to Change Orders, see Articles 10, 11, and 12.
- C. In connection with the ENGINEER’s responsibilities in respect of Applications for Payment, see Article 14.

9.8 **DECISIONS ON DISPUTES**

- A. The ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the WORK thereunder. Claims, disputes, and other matters relating to the acceptability of the WORK; the interpretation of the requirements of the Contract Documents pertaining to the performance of the WORK; and those claims under Articles 11 and 12 in respect to changes in the Contract Price or Contract Time will be referred initially to the ENGINEER in writing with a request for formal decision in accordance with this paragraph, which the ENGINEER will render in writing within 30 days of receipt of the request. Written notice of each such claim, dispute, and other matter will be delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 30 days) after the occurrence of the event giving rise thereto. Written supporting data will be submitted to the ENGINEER within 60 days after such occurrence unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim. The failure of the CONTRACTOR to provide all supporting documentation for the claim shall result in the denial of the claim and the waiver of the claim by the CONTRACTOR.
- B. The rendering of a decision by the ENGINEER with respect to any such claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 14.12) will be a condition precedent to any exercise by the OWNER or the CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Law or Regulations in respect of any such claim, dispute, or other matter.

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9.9 LIMITATION ON ENGINEER'S RESPONSIBILITIES

- A. Neither the ENGINEER's authority to act under this Article or other provisions of the Contract Documents nor any decision made by the ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the ENGINEER to the CONTRACTOR, any Subcontractor, any Supplier, any surety for any of them, or any other person or organization performing any of the WORK.
- B. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as reviewed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of the ENGINEER as to the WORK, it is intended that such requirement, direction, review, or judgment will be solely to evaluate the WORK for compliance with the requirements of the Contract Documents, and conformance with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, unless there is a specific statement indicating otherwise. The use of any such term or adjective shall not be effective to assign to the ENGINEER any duty or authority to supervise or direct the performance of the WORK or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.9C or 9.9D.
- C. The ENGINEER will not supervise, direct, control, or have authority over or be responsible for the CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of the CONTRACTOR to comply with Laws and Regulations, applicable to the performance of the WORK. The ENGINEER will not be responsible for the CONTRACTOR's failure to perform the WORK in accordance with the Contract Documents, except where the failure of the CONTRACTOR is the result of negligent acts or omissions of the ENGINEER in the ENGINEER's performance of its obligations.
- D. The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR nor of any Subcontractor, supplier, or any other person or organization performing any of the WORK.

ARTICLE 10 CHANGES IN THE WORK

10.1 GENERAL

- A. Without invalidating the Agreement and without notice to any surety, the OWNER may at any time or from time to time, order additions, deletions, or revisions in the WORK; these will be authorized by a written Field Order and/or a Change Order issued by the ENGINEER.
- B. If the CONTRACTOR believes that it is entitled to an increase or decrease in the Contract Price, or an extension or shortening in the Contract Time as the result of a Field Order, a claim may be made as provided in Articles 11 and 12.
- C. If the OWNER and CONTRACTOR agree on the value of any work, or the amount of Contract Time that should be allowed as a result of a Field Order, upon receiving written notice from the ENGINEER, the CONTRACTOR shall proceed so as to minimize the impact on and delays to the work pending the issuance of a Change Order.

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- D. If the OWNER and the CONTRACTOR are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or shortening of the Contract Time that should be allowed as a result of a Field Order, the ENGINEER can direct the CONTRACTOR to proceed on the basis of Time and Materials so as to minimize the impact on and delays to WORK, and a claim may be made therefor as provided in Articles 11 and 12.
- E. The CONTRACTOR shall not be entitled to an increase in the Contract Price nor an extension of the Contract Time with respect to any work performed that is not required by the Contract Documents as amended, modified, supplemented by Change Order, except in the case of an emergency and except in the case of uncovering work as provided in Paragraph 13.3G.
- F. The OWNER and the CONTRACTOR shall execute appropriate Change Orders covering:
1. changes in the WORK which are ordered by the OWNER pursuant to Paragraph 10.1A;
 2. changes required because of acceptance of Defective WORK under Paragraph 13.7;
 3. changes in the Contract Price or Contract Time which are agreed to by the parties; or
 4. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by the ENGINEER pursuant to Paragraph 9.8.
- G. If notice of any change is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be the CONTRACTOR's responsibility, and the amount of each applicable Bond shall be adjusted accordingly.

10.2 ALLOWABLE QUANTITY VARIATIONS

- A. In the event of an increase or decrease in Bid item quantity of a unit price contract, the total amount of WORK actually done or materials or equipment furnished shall be paid for according to the unit bid price established for such WORK under the Contract Documents, wherever such unit price has been established; provided, that an adjustment in the Contract Price may be made for changes which result in an increase or decrease in excess of 25% of the estimated quantity of any major item of the WORK. Major Item is defined as any bid item amount that is ten percent (10%) or more of the total contract amount.
- B. In the event a part of the WORK is to be entirely eliminated and no lump sum or unit price is named in the Contract Documents to cover such eliminated work, the price of the eliminated work shall be agreed upon in writing by the OWNER and the CONTRACTOR. If the OWNER and the CONTRACTOR fail to agree upon the price of the eliminated work, the price shall be determined in accordance with the provisions of Article 11.

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ARTICLE 11 CHANGE OF CONTRACT PRICE

11.1 GENERAL

- A. The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the WORK. All duties, responsibilities, and obligations assigned to or undertaken by the CONTRACTOR to complete the WORK shall be at its expense without change in the Contract Price.
- B. The Contract Price may only be changed by a Change Order approved by the Borough Assembly. Any claim for an increase in the Contract Price shall be based on written notice delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 7 days) after the start of the occurrence or the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with all supporting documentation and data shall be delivered within 14 days after such occurrence (unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR's written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the CONTRACTOR is entitled as a result of the occurrence or event. All claims for adjustment in the Contract Price shall be determined by the ENGINEER in accordance with Paragraph 9.8A if the OWNER and the CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this Paragraph 11.1B.
- C. The value of any work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:
 - 1. Where the work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved. Unit prices not specified in the contract documents shall be determined by the unit price for that item or items in the CONTRACTOR'S bid.
 - 2. By mutual acceptance of a lump sum, which may, but is not required to, include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.4.
 - 3. On the basis of the cost of work (determined as provided in Paragraphs 11.3) plus a CONTRACTOR's fee for overhead and profit (determined as provided in Paragraph 11.4).

- 11.2 COSTS RELATING TO WEATHER. The CONTRACTOR shall have no claims against the OWNER for damages for any injury to WORK, materials, or equipment, resulting from the action of the elements. If, however, in the opinion of the ENGINEER, the CONTRACTOR has made all reasonable efforts to protect the materials, equipment and work, the CONTRACTOR may be granted a reasonable extension of Contract Time to make proper repairs, renewals, and replacements of the work, materials, or equipment.

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11.3 COST OF WORK (BASED ON TIME AND MATERIALS)

- A. General. The term “cost of work” means the sum of all costs actually and necessarily incurred and paid by the CONTRACTOR for labor, materials, and equipment in the proper performance of extra work. Except as otherwise may be agreed to in writing by the OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project; shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.5 EXCLUDED COSTS.
- B. Labor. The costs of labor will be the actual cost for wages prevailing for each craft or type of workers performing the extra work at the time the extra work is done, plus employer payments of payroll taxes, worker’s compensation insurance, liability insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. Labor costs for equipment operators and helpers shall be paid only when such costs are not included in the invoice for equipment rental. The labor costs for forepersons shall be proportioned to all of their assigned work and only that applicable to extra work shall be paid. Non-direct labor costs including superintendence shall be considered part of the mark-up set out in paragraph 11.4.
- C. Materials. The cost of materials reported shall be at invoice or lowest current price at which materials are locally available and delivered to the job in the quantities involved, plus the cost of freight, delivery and storage, subject to the following:
 - 1. Trade discounts available to the purchaser shall be credited to the OWNER notwithstanding the fact that such discounts may not have been taken by the CONTRACTOR.
 - 2. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the ENGINEER. Mark-up except for actual costs incurred in the handling of such materials will not be allowed.
 - 3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on extra work items or the current wholesale price for such materials delivered to the work site, whichever price is lower.
 - 4. If in the opinion of the ENGINEER the cost of material is excessive, or the CONTRACTOR does not furnish satisfactory evidence of the cost of such material, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned delivered to the work site less trade discount. The OWNER reserves the right to furnish materials for the extra work and no claim shall be allowed by the CONTRACTOR for costs and profit on such materials.

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- D. Equipment. The CONTRACTOR will be paid for the use of equipment at the rental rate listed for such equipment specified in the Supplementary General Conditions. Such rental rate will be used to compute payments for equipment whether the equipment is under the CONTRACTOR's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate resulting in the least total cost to the OWNER for the total period of use. If it is deemed necessary by the CONTRACTOR to use equipment not listed in the publication specified in the Supplementary General Conditions, an equitable rental rate for the equipment will be established by the ENGINEER. The CONTRACTOR may furnish cost data which might assist the ENGINEER in the establishment of the rental rate. The CONTRACTOR shall not be entitled for any rental rate for equipment the use of which would have necessary to provide the unit of work and which should have been included in the CONTRACTOR'S bid price for that unit of work.
1. All equipment shall, in the opinion of the ENGINEER, be in good working condition and suitable for the purpose for which the equipment is to be used.
 2. Before construction equipment is used on the extra work, the CONTRACTOR shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the ENGINEER, in duplicate, a description of the equipment and its identifying number.
 3. Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
 4. Individual pieces of equipment or tools having a replacement value of \$200 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefor.
 5. Rental time will not be allowed while equipment is inoperative due to breakdowns.
 6. Equipment Rental Rates. Unless otherwise agreed in writing, the CONTRACTOR will be paid for the use of equipment at the rental rate listed for such equipment specified in the current edition of the following reference publication: "Rental Rate Blue Book" as published by Dataquest (a company of the Dunn and Bradstreet Corporation), 1290 Ridder Park Drive, San Jose, CA 95131, telephone number (800) 227-8444.
- E. Equipment on the Work Site. The rental time to be paid for equipment on the work site shall be the time the equipment is in productive operation on the extra work being performed and, in addition, shall include the time required to move the equipment to the location of the extra work and return it to the original location or to another location requiring no more time than that required to return it to its original location; except, that moving time will not be paid if the equipment is used on other than the extra work, even though located at the site of the extra work, or if it was not necessary to move equipment from another location to the site. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power, except that no payment will be made for loading and transporting costs when the equipment is used at the site of the extra work on other than the extra work. The following shall be used in computing the rental time of equipment on the work site.
1. When hourly rates are listed, any part of an hour less than 30 minutes of operation shall be considered to be 1/2-hour of operation, and any part of an hour in excess of 30 minutes will be considered one hour of operation.

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2. When daily rates are listed, any part of a day less than 4 hours operation shall be considered to be 1/2-day of operation. When owner-operated equipment is used to perform extra work to be paid for on a time and materials basis, the CONTRACTOR will be paid for the equipment and operator, as set forth in Paragraphs (3), (4), and (5), following.
 3. Payment for the equipment will be made in accordance with the provisions in Paragraph 11.3D, herein.
 4. Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the CONTRACTOR to other workers operating similar equipment already on the work site, or in the absence of such labor, established by collective bargaining agreements for the type of worker and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of Paragraph 11.3B, herein, which surcharge shall constitute full compensation for payments imposed by state and federal laws and all other payments made to or on behalf of workers other than actual wages.
 5. To the direct cost of equipment rental and labor, computed as provided herein, will be added the allowances for equipment rental and labor as provided in Paragraph 11.4, herein.
- F. Specialty Work. Specialty work is defined as that work characterized by extraordinary complexity, sophistication, or innovation or a combination of the foregoing attributes which are unique to the construction industry. The following shall apply in making estimates for payment for specialty work:
1. Any bid item of WORK to be classified as Specialty Work shall be listed as such in the Supplementary General Conditions. Specialty work shall be performed by an entity especially skilled in the work to be performed. After validation of invoices and determination of market values by the ENGINEER, invoices for specialty work based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental costs.
 2. When the CONTRACTOR is required to perform work necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the job site, the charges for that portion of the work performed at the off-site facility may, by agreement, be accepted as specialty work and accordingly, the invoices for the work may be accepted without detailed itemization.
 3. All invoices for specialty work will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of the allowances for overhead and profit specified in Paragraph 11.4, herein, an allowance of 5 percent will be added to invoices for specialty work.
- G. Sureties. All work performed hereunder shall be subject to all of the provisions of the Contract Documents and the CONTRACTOR's sureties shall be bound with reference thereto as under the original Agreement. Copies of all amendments to surety bonds or supplemental surety bonds shall be submitted to the OWNER for review prior to the performance of any work hereunder.

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11.4 CONTRACTOR'S FEE

- A. Extra work ordered on the basis of time and materials will be paid for at the actual necessary cost as determined by the ENGINEER, plus allowances for overhead and profit. The allowance for overhead and profit shall include full compensation for superintendence, bond and insurance premiums, taxes, field office expense, extended overhead, home office overhead, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Paragraph 11.3. The allowance for overhead and profit will be made in accordance with the following schedule:

Actual Overhead and Profit Allowance

| | |
|-----------------|------------|
| Labor | 15 percent |
| Materials..... | 10 percent |
| Equipment | 10 percent |

To the sum of the costs and mark-ups provided for in this Article, one percent shall be added as compensation for bonding.

- B. It is understood that labor, materials, and equipment may be furnished by the CONTRACTOR or by the Subcontractor on behalf of the CONTRACTOR. When all or any part of the extra work is performed by a Subcontractor, the allowance specified herein shall be applied to the labor, materials, and equipment costs of the Subcontractor, to which the CONTRACTOR may add 5 percent of the Subcontractor's total cost for the extra work. Regardless of the number of hierarchical tiers of Subcontractors, the 5 percent increase above the Subcontractor's total cost which includes the allowances for overhead and profit specified herein may be applied one time only.

11.5 EXCLUDED COSTS. The term Cost of the Work shall not include any of the following:

- A. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, estimators, attorneys' auditors, accountants, purchasing and contracting agents, expenditures, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the work, or not specifically covered by paragraph 11.3, all of which are to be considered administrative costs covered by the CONTRACTOR's fee.
- B. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.
- C. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.
- D. Cost of premiums for all bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by paragraph 11.4 above).

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- E. Costs due to the negligence of CONTRACTOR , any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of Defective WORK, disposal of materials or equipment wrongly supplied and making good any damage to property.
- F. Other overhead or general expense costs of any kind and the cost of any item not specifically and expressly included in paragraph 11.4.
- G. Equipment rental cost for equipment that would be needed to perform the unit of work as reflected in the bid price for that unit of work.
- H. Mobilization or demobilization for equipment that would necessarily have been used to perform that unit of work as reflected in the bid price for that unit of work.

ARTICLE 12 CHANGE OF CONTRACT TIME

12.1 GENERAL

- A. The Contract Time may only be changed by a Change Order. Any claim for an extension of the Contract Time (or Milestones) shall be based on written notice delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than 30 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within 60 days after such occurrence (unless the ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR'S written statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by the ENGINEER in accordance with Paragraph 9.8 if the OWNER and the CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this Paragraph 12.1A. An increase in Contract Time does not mean that the Contractor is due an increase in Contract Price. Only Compensable time extensions will result in an increase in Contract Price.
- B. All time limits stated in the Contract Documents are of the essence of the Agreement. OWNER reserves the right to direct CONTRACTOR to accelerate his work, at no cost to OWNER, if CONTRACTOR fails to maintain contract schedule.
- C. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost on the critical path of the project due to such delay if a claim is made therefor as provided in paragraph 12.1. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, unprecedented weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

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D. Where CONTRACTOR is prevented from completing any part of the WORK within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost on the critical path of the project due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall the OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii) delays beyond the control of both parties including but not limited to fires, floods, epidemics abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

12.2 EXTENSIONS OF TIME FOR DELAY DUE TO WEATHER. Contract Time may be extended by the ENGINEER because of delays in completion of the WORK due to unusually severe weather, provided that the CONTRACTOR shall, within 10 days of the beginning of any such delay, notify the ENGINEER in writing of the cause of delay and request an extension of Contract Time. The ENGINEER will ascertain the facts and the extent of the delay and extend the time for completing the work when, in the ENGINEER's judgment, the findings of fact justify such an extension. Unprecedented, abnormal, or unusually severe weather will be defined as an event, or events, with a greater than 50-year recurrence interval, as determined by the National Weather Service, or equivalent State or Federal agency

ARTICLE 13 WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

13.1 WARRANTY AND GUARANTEE. The CONTRACTOR warrants and guarantees to the OWNER and the ENGINEER that all work will be in accordance with the Contract Documents and will not be defective. Prompt notice of defects known to the OWNER or ENGINEER shall be given to the CONTRACTOR. All defective work, whether or not in place, may be rejected, corrected, or accepted as provided in this Article 13.

13.2 ACCESS TO WORK. OWNER, ENGINEER, their Consultants, sub-consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

13.3 TESTS AND INSPECTIONS

A. The CONTRACTOR shall give the ENGINEER timely notice of readiness of the WORK for all required inspections, tests, or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

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- B. If Laws or Regulations of any public body having jurisdiction other than the OWNER require any WORK to specifically be inspected, tested, or approved, the CONTRACTOR shall pay all costs in connection therewith. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the OWNER's or the ENGINEER's acceptance of a Supplier of materials or equipment proposed as a substitution or (or-equal) to be incorporated in the WORK, or of materials or equipment submitted for review prior to the CONTRACTOR's purchase thereof for incorporation in the WORK. The cost of all inspections, tests, and approvals in addition to the above which are required by the Contract Documents shall be paid by the OWNER (unless otherwise specified).
- C. The ENGINEER will make, or have made, such inspections and tests as the ENGINEER deems necessary to see that the WORK is being accomplished in accordance with the requirements of the Contract Documents. Unless otherwise specified in the Supplementary General Conditions, the cost of such inspection and testing will be borne by the OWNER. In the event such inspections or tests reveal non-compliance with the requirements of the Contract Documents, the CONTRACTOR shall bear the cost of corrective measures deemed necessary by the ENGINEER, as well as the cost of subsequent reinspection and retesting. Neither observations by the ENGINEER nor inspections, tests, or approvals by others shall relieve the CONTRACTOR from the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.
- D. All inspections, tests, or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to the ENGINEER and the CONTRACTOR.
- E. If any work (including the work of others) that is to be inspected, tested, or approved is covered without written concurrence of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for observation. Such uncovering shall be at the CONTRACTOR's expense unless the CONTRACTOR has given the ENGINEER timely notice of the CONTRACTOR's intention to perform such test or to cover the same and the ENGINEER has not acted with reasonable promptness in response to such notice.
- F. If any WORK is covered contrary to the written request of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for the ENGINEER's observation and recovered at the CONTRACTOR's expense.
- G. If the ENGINEER considers it necessary or advisable that covered WORK be observed by the ENGINEER or inspected or tested by others, the CONTRACTOR, at the ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, material, and equipment. If it is found that such work is defective, the CONTRACTOR shall bear all direct, indirect, and consequential costs and damages of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction, including but not limited to fees and charges of engineers, attorneys, and other professionals. However, if such work is not found to be defective, the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, the CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

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- 13.4 **OWNER MAY STOP THE WORK.** If the WORK is defective, or the CONTRACTOR fails to perform work in such a way that the completed WORK will conform to the Contract Documents, the OWNER may order the CONTRACTOR to stop the WORK, or any portion thereof, until the cause for such order has been eliminated; however, this right of the OWNER to stop the WORK shall not give rise to any duty on the part of the OWNER to exercise this right for the benefit of the CONTRACTOR or any other party.
- 13.5 **CORRECTION OR REMOVAL OF DEFECTIVE WORK.** If required by the ENGINEER, the CONTRACTOR shall promptly, either correct all defective work, whether or not fabricated, installed, or completed, or, if the WORK has been rejected by the ENGINEER, remove it from the site and replace it with non-defective work. The CONTRACTOR shall bear all direct, indirect and consequential costs and damages of such correction or removal, including but not limited to fees and charges of engineers, attorneys, and other professionals made necessary thereby.
- 13.6 **ONE YEAR CORRECTION PERIOD**
- A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any work is found to be defective, the CONTRACTOR shall promptly, without cost to the OWNER and in accordance with OWNER's written notification, (i) correct such Defective WORK, or, if it has been rejected by the OWNER, remove it from the site and replace it with non-defective work, and (ii) satisfactorily correct or remove and replace any damage to other work of others resulting therefrom. If the CONTRACTOR does not promptly comply with such notification, or in an emergency where delay would cause serious risk of loss or damage, the OWNER may have the Defective WORK corrected or the rejected WORK removed and replaced, and all direct, indirect, and consequential costs and damages of such removal and replacement including but not limited to fees and charges of engineers, attorneys and other professionals will be paid by the CONTRACTOR.
- B. Where Defective WORK (and damage to other WORK resulting therefrom) has been corrected, removed or replaced under this paragraph 13.6, the correction period hereunder with respect to such WORK will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- 13.7 **ACCEPTANCE OF DEFECTIVE WORK.** If, instead of requiring correction or removal and replacement of defective work, the OWNER prefers to accept the WORK, the OWNER may do so. The CONTRACTOR shall bear all direct, indirect, and consequential costs attributable to the OWNER's evaluation of and determination to accept such defective work. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the WORK, and the OWNER shall be entitled to an appropriate decrease in the Contract Price.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

- 14.1 **SCHEDULE OF VALUES (LUMP SUM PRICE BREAKDOWN).** The schedule of values or lump sum price breakdown established as provided in the General Requirements shall serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the ENGINEER.

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14.2 UNIT PRICE BID SCHEDULE. Progress payments on account of Unit Price work will be based on the number of units completed.

14.3 APPLICATION FOR PROGRESS PAYMENT

- A. Unless otherwise prescribed by law, on the 25th of each month, the CONTRACTOR shall submit to the ENGINEER for review, an Application for Payment filled out and signed by the CONTRACTOR covering the WORK completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
- B. The Application for Payment shall identify, as a sub-total, the amount of the CONTRACTOR'S Total Earnings to Date, plus the Value of Materials Stored at the Site which have not yet been incorporated in the WORK, and less a deductive adjustment for materials installed which were not previously incorporated in the WORK, but for which payment was allowed under the provisions for payment for Materials Stored at the Site, but not yet incorporated in the WORK.
- C. Each Application for Payment shall be submitted with an updated Progress Schedule, as required in Section 01300 Contractor Submittals. Each Application for Payment will also be accompanied by Contractor and Subcontractor certified payroll reports for periods covered by the period covered by the Application for Payment.
- D. The Net Payment Due the CONTRACTOR shall be the above-mentioned subtotal from which shall be deducted the total amount of all previous payments made to the CONTRACTOR. Progress payments will be paid in full in accordance with Article 14 of the General Conditions until 90% of the Contract Price has been paid. The remaining 10% of the Contract Price amount may be withheld until:
1. final inspection has been made;
 2. completion of the project; and
 3. acceptance of the project by the OWNER.
- E. The Value of Materials Stored at the Site shall be an amount equal to the specified percent of the value of such materials as set forth in the Supplementary General Conditions. Said amount shall be based upon the value of all acceptable materials and equipment not incorporated in the WORK but delivered and suitably stored at the site or at another location agreed to in writing; provided, each such individual item has a value of more than \$5,000.00 and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by an invoice (including shipping), a certification that the materials meet the applicable contract specifications, and any evidence required by the OWNER that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the OWNER's interest therein, all of which will be satisfactory to the OWNER. Payment for materials will not constitute final acceptance. It shall be the CONTRACTOR's responsibility to protect the material from damage, theft, loss, or peril while in storage. Unless otherwise prescribed by law, the Value of Materials Stored at the Site shall be paid at the invoice amount up to a maximum of 85% of the Contract Price for those items.

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14.4 **CONTRACTOR'S WARRANTY OF TITLE.** The CONTRACTOR warrants and guarantees that title to all work, materials, and equipment covered by an Application for Payment, whether incorporated in the WORK or not, will pass to the OWNER no later than the time of payment free and clear of all liens.

14.5 **REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT**

- A. The ENGINEER will, within 7 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the OWNER, or return the Application to the CONTRACTOR indicating in writing the ENGINEER's reasons for refusing to recommend payment. In the later case, the CONTRACTOR may make the necessary corrections and resubmit the Application, at which point the 7 days for ENGINEER review will begin again. If the ENGINEER still disagrees with a portion of the Application, it will submit the Application recommending the undisputed portion of the Application to the OWNER for payment and provide reasons for recommending non-payment of the disputed amount. Thirty days after presentation of the Application for Payment with the ENGINEER's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.5B) become due and when due will be paid by the OWNER to the CONTRACTOR.
- B. The OWNER may refuse to make payment of the full amount recommended by the ENGINEER because claims have been made against the OWNER on account of the CONTRACTOR's performance of the WORK or Liens have been filed in connection with the WORK or there are other items entitling the OWNER to a credit against the amount recommended, but the OWNER must give the CONTRACTOR written notice within 7 days (with a copy to the ENGINEER) stating the reasons for such action.

14.6 **PARTIAL UTILIZATION**

- A. The OWNER shall have the right to utilize or place into service any item of equipment or other usable portion of the WORK prior to completion of the WORK. Whenever the OWNER plans to exercise said right, the CONTRACTOR will be notified in writing by the OWNER, identifying the specific portion or portions of the WORK to be so utilized or otherwise placed into service.
- B. It shall be understood by the CONTRACTOR that until such written notification is issued, all responsibility for care and maintenance of all of the WORK shall be borne by the CONTRACTOR. Upon issuance of said written notice of partial utilization, the OWNER will accept responsibility for the protection and maintenance of all such items or portions of the WORK described in the written notice.
- C. The CONTRACTOR shall retain full responsibility for satisfactory completion of the WORK, regardless of whether a portion thereof has been partially utilized by the OWNER and the CONTRACTOR's one year correction period shall commence only after the date of Substantial Completion for the WORK.

SECTION 00700 - GENERAL CONDITIONS

- 14.7 **SUBSTANTIAL COMPLETION.** When the CONTRACTOR considers the WORK ready for its intended use the CONTRACTOR shall notify the OWNER and the ENGINEER in writing that the WORK is substantially complete. The CONTRACTOR will attach to this request a list of all work items that remain to be completed and a request that the ENGINEER prepare a Notice of Completion. Within a reasonable time thereafter, the OWNER, the CONTRACTOR, and the ENGINEER shall make an inspection of the WORK to determine the status of completion. If the ENGINEER does not consider the WORK substantially complete, or the list of remaining work items to be comprehensive, the ENGINEER will notify the CONTRACTOR in writing giving the reasons therefor. If the ENGINEER considers the WORK substantially complete, the ENGINEER will prepare and deliver to the OWNER, for its execution and recording, the Notice of Completion signed by the ENGINEER and CONTRACTOR, which shall fix the date of Substantial Completion.
- 14.8 **FINAL APPLICATION FOR PAYMENT.** After the CONTRACTOR has completed all of the remaining work items referred to in Paragraph 14.7 and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, contract releases, record as-built documents (as provided in the General Requirements) and other documents, all as required by the Contract Documents, and after the ENGINEER has indicated that the WORK is acceptable, the CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to the OWNER) of all liens arising out of or filed in connection with the WORK.
- 14.9 **FINAL PAYMENT AND ACCEPTANCE**
- A. If, on the basis of the ENGINEER's observation of the WORK during construction and final inspection, and the ENGINEER's review of the final Application for Payment and accompanying documentation, all as required by the Contract Documents, the ENGINEER is satisfied that the WORK has been completed and the CONTRACTOR's other obligations under the Contract Documents have been fulfilled, the ENGINEER will, within 14 days after receipt of the final Application for Payment, indicate in writing the ENGINEER's recommendation of payment and present the Application to the OWNER for payment.
- B. After acceptance of the WORK by the OWNER's governing body, the OWNER will make final payment to the CONTRACTOR of the amount remaining after deducting all prior payments and all amounts to be kept or retained under the provisions of the Contract Documents, including the following items:
1. Liquidated damages, as applicable.
 2. Two times the value of outstanding items of correction work or punch list items yet uncompleted or uncorrected, as applicable. All such work shall be completed or corrected to the satisfaction of the OWNER within the time stated on the Notice of Completion, otherwise the CONTRACTOR does hereby waive any and all claims to all monies withheld by the OWNER to cover the value of all such uncompleted or uncorrected items.

SECTION 00700 - GENERAL CONDITIONS

14.10 RELEASE OF RETAINAGE AND OTHER DEDUCTIONS

- A. After executing the necessary documents to initiate the lien period, and not more than 45 days thereafter (based on a 30-day lien filing period and 15-day processing time), the OWNER will release to the CONTRACTOR the retainage funds withheld pursuant to the Agreement, less any deductions to cover pending claims against the OWNER pursuant to Paragraph 14.5B.
- B. After filing of the necessary documents to initiate the lien period, the CONTRACTOR shall have 30 days to complete any outstanding items of correction work remaining to be completed or corrected as listed on a final punch list made a part of the Notice of Completion. Upon expiration of the 45 days, referred to in Paragraph 14.10A, the amounts withheld pursuant to the provisions of Paragraph 14.9B herein, for all remaining work items will be returned to the CONTRACTOR; provided, that said work has been completed or corrected to the satisfaction of the OWNER within said 30 days. Otherwise, the CONTRACTOR does hereby waive any and all claims for all monies withheld by the OWNER under the Contract to cover 2 times the value of such remaining uncompleted or uncorrected items.

14.11 **CONTRACTOR'S CONTINUING OBLIGATION.** The CONTRACTOR's obligation to perform and complete the WORK in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the ENGINEER, nor the issuance of a Notice of Completion, nor any payment by the OWNER to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the WORK or any part thereof by the OWNER, nor any act of acceptance by the OWNER nor any failure to do so, nor any review of a Shop Drawing or sample submittal, will constitute an acceptance of work not in accordance with the Contract Documents or a release of the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.

14.12 **FINAL PAYMENT TERMINATES LIABILITY OF OWNER.** Final payment is defined as the last progress payment made to the CONTRACTOR for earned funds, less monies withheld as applicable, pursuant to Paragraph 14.10A. The acceptance by the CONTRACTOR of the final payment referred to in Paragraph 14.9 herein, shall be a release of the OWNER and its agents from all claims of liability to the CONTRACTOR for anything done or furnished for, or relating to, the WORK or for any act of neglect of the OWNER or of any person relating to or affecting the WORK, except demands against the OWNER for the remainder, if any, of the amounts kept or retained under the provisions of Paragraph 14.9 herein; and excepting pending, unresolved claims filed prior to the date of the Notice of Completion.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

15.1 **SUSPENSION OF WORK BY OWNER.** The OWNER, acting through the ENGINEER, may, at any time and without cause, suspend the WORK or any portion thereof for a period of not more than 90 days by notice in writing to the CONTRACTOR. The CONTRACTOR shall resume the WORK on receipt from the ENGINEER of a notice of resumption of work. The CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if the CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

SECTION 00700 - GENERAL CONDITIONS

15.2 TERMINATION OF AGREEMENT BY OWNER (CONTRACTOR DEFAULT)

- A. In the event of default by the CONTRACTOR, the OWNER may give 10 days written notice to the CONTRACTOR of OWNER's intent to terminate the Agreement and provide the CONTRACTOR an opportunity to remedy the conditions constituting the default. It shall be considered a default by the CONTRACTOR whenever CONTRACTOR shall: (1) declare bankruptcy, become insolvent, or assign its assets for the benefit of its creditors; (2) fail to provide materials or quality of work meeting the requirements of the Contract Documents; (3) disregard or violate provisions of the Contract Documents or ENGINEER's instructions; (4) fail to prosecute the WORK according to the approved progress schedule; or, (5) fail to provide a qualified superintendent, competent workers, or materials or equipment meeting the requirements of the Contract Documents; or 5) breach any of the material terms of the Agreement or the Contract documents. If the CONTRACTOR fails to remedy the conditions constituting default within the time allowed, the OWNER may then issue the Notice of Termination.
- B. In the event the Agreement is terminated in accordance with Paragraph 15.2A, herein, the OWNER may take possession of the WORK and may complete the WORK by whatever method or means the OWNER may select. The cost of completing the WORK shall be deducted from the balance which would have been due the CONTRACTOR had the Agreement not been terminated and the WORK completed in accordance with the Contract Documents. If such cost exceeds the balance which would have been due, the CONTRACTOR shall pay the excess amount to the OWNER. If such cost is less than the balance which would have been due, the CONTRACTOR shall not have claim to the difference.

15.3 TERMINATION OF AGREEMENT BY OWNER (FOR CONVENIENCE). The OWNER may terminate the Agreement at any time in its sole discretion in the best interests of the City and Borough of Wrangell. In such a case, the CONTRACTOR shall have no claims against the OWNER except: (1) for the value of work performed up to the date the Agreement is terminated, which shall be based on the CONTRACTOR'S bid price for all units of work performed and in no circumstances shall exceed the bid price for each unit of work actually performed; and, (2) for the cost of materials and equipment on hand, in transit, or on definite commitment, as of the date the Agreement is terminated which would be needed in the WORK and which meet the requirements of the Contract Documents. The value of work performed and the cost of materials and equipment delivered to the site, as mentioned above, shall be determined by the ENGINEER in accordance with the procedure prescribed for the making of the final application for payment and payment under Paragraphs 14.8 and 14.9.

15.4 TERMINATION OF AGREEMENT BY CONTRACTOR. The CONTRACTOR may terminate the Agreement upon 10 days written notice to the OWNER, whenever: 1) the WORK has been suspended under the provisions of Paragraph 15.1, herein, for more than 90 consecutive days through no fault or negligence of the CONTRACTOR, and notice to resume work or to terminate the Agreement has not been received from the OWNER within this time period; or, 2) the OWNER should fail to pay the CONTRACTOR any monies due him as approved for payment by the ENGINEER in accordance with the terms of the Contract Documents and within 60 days after presentation to the OWNER by the CONTRACTOR of a request therefor, unless within the 10-day period the OWNER shall have remedied the condition upon which the payment delay was based. In the event of such termination, the CONTRACTOR shall have no claims against the OWNER except for those claims specifically enumerated in Paragraph 15.3, herein, and as determined in accordance with the requirements of that paragraph.

SECTION 00700 - GENERAL CONDITIONS

ARTICLE 16 MISCELLANEOUS

- 16.1 GIVING NOTICE. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice. E-mail shall not constitute written notice.
- 16.2 RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK
- A. The CONTRACTOR may use on the Project, with ENGINEER's approval, such stone, gravel, sand, or other material determined suitable by the ENGINEER, as may be found in the excavation. The CONTRACTOR will be paid for the excavation of such material at the corresponding contract unit price. No additional payment will be made for utilizing the material from excavation as borrow or select borrow.
 - B. The CONTRACTOR shall replace, at its own expense, with other acceptable material, all of that portion of the excavated material so removed and used which was needed for use on the project. No charge for the materials so used will be made against the CONTRACTOR except that the CONTRACTOR shall be responsible for payment of any royalties required.
 - C. The CONTRACTOR shall not excavate or remove any material from within the Project location which is not within the grading limits, as indicated by the slope and grade lines, without written authorization from the ENGINEER.
 - D. In the event the CONTRACTOR has processed materials from OWNER-furnished sources in excess of the quantities required for performance of this contract, including any waste material produced as a by-product, the OWNER may retain possession of such materials without obligation to reimburse the CONTRACTOR for the cost of their production. When such materials are in a stockpile, the ENGINEER may require: That it remain in stockpile; the CONTRACTOR level such stockpile(s); or that the CONTRACTOR remove such materials and restore the premises to a satisfactory condition at the CONTRACTOR's expense. This provision shall not preclude the OWNER from arranging with the CONTRACTOR to produce material over and above the contract needs, payment for which shall be by written agreement between the OWNER and the CONTRACTOR.
 - E. Unless otherwise provided, the material from any existing old structure may be used temporarily by the CONTRACTOR in the erection of the new structure. Such material shall not be cut or otherwise damaged except with the approval of the ENGINEER.

SECTION 00700 - GENERAL CONDITIONS

- 16.3 **RIGHT TO AUDIT.** If the CONTRACTOR submits a claim to the OWNER for additional compensation, the OWNER shall have the right, as a condition to considering the claim, and as a basis for evaluation of the claim, and until the claim has been settled, to audit the CONTRACTOR's books to the extent they are relevant. This right shall include the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to discover and verify all direct and indirect costs of whatever nature claimed to have been incurred or anticipated to be incurred and for which the claim has been submitted. The right to audit shall include the right to inspect the CONTRACTOR's plants, or such parts thereof, as may be or have been engaged in the performance of the WORK. The CONTRACTOR further agrees that the right to audit encompasses all subcontracts and is binding upon Subcontractors. The rights to examine and inspect herein provided for shall be exercisable through such representatives as the OWNER deems desirable during the CONTRACTOR's normal business hours at the office of the CONTRACTOR. The CONTRACTOR shall make available to the OWNER for auditing, all relevant accounting records and documents, and other financial data, and upon request, shall submit true copies of requested records to the OWNER.
- 16.4 **ARCHAEOLOGICAL OR HISTORICAL DISCOVERIES.** When the CONTRACTOR's operation encounters prehistoric artifacts, burials, remains of dwelling sites, paleontological remains, such as shell heaps, land or sea mammal bones or tusks, or other items of historical significance, the CONTRACTOR shall cease operations immediately and notify the ENGINEER. No artifacts or specimens shall be further disturbed or removed from the ground and no further operations shall be performed at the site until so directed. Should the ENGINEER order suspension of the CONTRACTOR's operations in order to protect an archaeological or historical finding, or order the CONTRACTOR to perform extra work, such order(s) shall be covered by an appropriate contract change document.
- 16.5 **CONSTRUCTION OVER OR ADJACENT TO NAVIGABLE WATERS.** All work over, on, or adjacent to navigable waters shall be so conducted that free navigation of the waterways will not be interfered with and the existing navigable depths will not be impaired, except as allowed by permit issued the U.S. Coast Guard and/or the U.S. Army Corps of Engineers, as applicable.
- 16.6 **GRATUITY AND CONFLICT OF INTEREST.** The CONTRACTOR agrees to not extend any loan, gratuity, or gift of money of any form whatsoever to any employee or elected official of the OWNER.
- 16.7 **SUITS OF LAW CONCERNING THE WORK**
- A. The Superior Court for the State of Alaska, First Judicial District at Wrangell, Alaska, shall be the exclusive jurisdiction and venue for any action of any kind an any nature arising out of or relating to this Agreement and all Contract documents or for any action of any kind and any nature arising out of or related to the performance of non-performance of the CONTRATOR, and CONTRACTOR'S employees, subcontractors, consultants and representatives.
- B. If one of the questions at issue is the satisfactory performance of the work by the CONTRACTOR and should the appropriate court of law judge the work of the CONTRACTOR to be unsatisfactory, then the CONTRACTOR (or the CONTRACTOR's surety) shall reimburse the OWNER for all legal and all other expenses (as may be allowed and set by the court) incurred by the OWNER because of the suit of the law and, further, it is agreed that the OWNER may deduct such expense from any sum or sums then, or any that become due the CONTRACTOR under the contract.

SECTION 00700 - GENERAL CONDITIONS

16.8 CERTIFIED PAYROLLS

- A. All CONTRACTORS or Subcontractor who perform work on a public construction contract for the OWNER shall file a certified payroll with the Alaska Department of Labor before Friday of each week that covers the preceding week (Section 14-2-4 ACLA 1949; am Section 4 ch 142 SLA 1972).
- B. In lieu of submitting the State payroll form, the CONTRACTOR's standard payroll form may be submitted, provided it contains the information required by AS 36.05.040 and a statement that the CONTRACTOR is complying with AS 36.10.010.
- C. A CONTRACTOR or Subcontractor, who performs work on public construction in the State, as defined by AS 36.95.010(3), shall pay not less than the current prevailing rate of wages as issued by the Alaska Department of Labor before the end of the pay period. (AS 36.05.010).

16.9 PREVAILING WAGE RATES

- A. Wage rates for Laborers and Mechanics on Public Contracts, AS 36.05.070. The CONTRACTOR, or Subcontractors, shall pay all employees unconditionally and not less than once a week. Wages may not be less than those stated in Paragraph 16.8C, regardless of the contractual relationship between the CONTRACTOR or Subcontractors and laborers, mechanics, or field surveyors. The scale of wages to be paid shall be posted by the CONTRACTOR in a prominent, easily accessible place at the site of the WORK.
- B. Failure to Pay Agreed Wages, AS 36.05.080. If it is found that a laborer, mechanic, or field surveyor employed by the CONTRACTOR or Subcontractor has been, or is being, paid a rate or wages less than the established rate, the OWNER may, by written notice, terminate the CONTRACTOR or Subcontractors right to proceed with the work. The OWNER may prosecute the work to completion by contract or otherwise, and the CONTRACTOR and sureties will be held liable to the OWNER for excess costs for completing the WORK. (Section 2 ch 52 SLA 1959).
- F. Listing CONTRACTOR's Who Violate Contracts, AS 36.05.090. In addition, a list giving the names of persons who have disregarded the rights of their employees shall be distributed to all departments of State government and all political subdivisions. No person appearing on this list, and no firm, corporation, partnership or association in which the person has an interest, may work as a CONTRACTOR or Subcontractor on a public construction contract for the State, or a political subdivision of the state, until three years after the date of publication of the list. (Section 3 ch 52 SLA 1959; am Section 9 ch 142 SLA).

16.10 EMPLOYMENT REFERENCE. Workers employed in the execution of the contract by the CONTRACTOR or by any Subcontractor under this contract shall not be required or permitted to labor more than 8 hours a day or 40 hours per week in violation of the provisions of the Alaska Wage and Hour Act, Section 23.10.060.

SECTION 00700 - GENERAL CONDITIONS

16.11 COST REDUCTION INCENTIVE

- A. At any time within 45 days after the date of the Notice of Award, the CONTRACTOR may submit to the ENGINEER in writing, proposals for modifying the plans, specifications, or other requirements of this contract for the sole purpose of reducing the total cost of construction. The cost reduction proposal shall not impair in any manner the essential functions or characteristics of the project, including but not limited to, service life, economy of operation, ease of maintenance, desired appearance or design and safety standards.
- B. The cost reduction proposal shall contain the following information:
1. Description of both the existing contract requirements for performing the WORK and the proposed changes.
 2. An itemization of the contract requirements that must be changed if the proposal is adopted.
 3. A detailed estimate of the time required and the cost of performing the WORK under both the existing contract and the proposed change.
 4. A statement of the date by which the CONTRACTOR must receive the decision from the OWNER on the cost reduction proposal.
 5. The contract items of WORK affected by the proposed changes including any quantity variations.
 6. A description and estimate of costs the OWNER may incur in implementing the proposed changes, such as test and evaluation and operating and support costs.
 7. A prediction of any effects the proposed change would have on future operations and maintenance costs to the OWNER.
- C. The provisions of this section shall not be construed to require the OWNER to consider any cost reduction proposal which may be submitted; nor will the OWNER be liable to the CONTRACTOR for failure to accept or act upon any cost reduction proposal submitted, or for delays to the work attributable to the consideration or implementation of any such proposal.
- D. If a cost reduction proposal is similar to a change in the plans or specifications for the project under consideration by the OWNER at the time the proposal is submitted, the OWNER will not accept such proposal and reserves the right to make such changes without compensation to the CONTRACTOR under the provisions of this section.
- E. The CONTRACTOR shall continue to perform the work in accordance with the requirements of the contract until an executed Change Order incorporating the cost reduction proposal has been issued. If any executed Change Order has not been issued by the date upon which the CONTRACTOR's cost reduction proposal specifies that a decision should be made by the OWNER, in writing, the cost reduction proposal shall be considered rejected.
- F. The OWNER shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings in Contract Time and construction costs resulting from the adoption of all or any part of such proposal. Should the CONTRACTOR disagree with OWNER's decision on the cost reduction proposal, there is no further consideration. The OWNER reserves the right to make final determination.

SECTION 00700 - GENERAL CONDITIONS

- G. If the CONTRACTOR's cost reduction proposal is accepted in whole or in part, such acceptance will be made by a contract Change Order, which specifically states that the change is executed pursuant to this cost reduction proposal section. Such Change Order shall incorporate the changes in the plans and specifications which are necessary to permit the cost reduction proposal or such part of it as has been accepted to be put into effect and shall include any conditions upon which the OWNER's approval is based, if such approval is conditional. The Change Order shall also describe the estimated net savings in the cost of performing the work attributable to the cost reduction proposal, and shall further provide that the contract cost be adjusted by crediting the OWNER with the estimated net savings amount.
- H. Acceptance of the cost reduction proposal and performance of the work does not extend the time of completion of the contract, unless specifically provided in the Change Order authorizing the use of the submitted proposal. Should the adoption of the cost reduction proposal result in a Contract Time savings, the total Contract Time shall be reduced by an amount equal to the time savings realized.
- I. The amount specified to the CONTRACTOR in the Change Order accepted in the cost reduction proposal shall constitute full compensation for the performance of WORK. No claims for additional costs as a result of the changes specified in the cost reduction proposal shall be allowed.
- J. The OWNER reserves the right to adopt and utilize any approved cost reduction proposal for general use on any contract administered when it is determined suitable for such application. Cost reduction proposals identical, similar, or previously submitted will not be accepted for consideration if acceptance and compensation has previously been approved. The OWNER reserves the right to use all or part of any cost reduction proposal without obligation or compensation of any kind to the CONTRACTOR.
- K. The CONTRACTOR shall bear the costs, if any, to revise all bonds and insurance requirements for the project, to include the cost reduction WORK.

SECTION 00700 - GENERAL CONDITIONS

END OF SECTION

SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

GENERAL. These Supplementary General Conditions make additions, deletions, or revisions to the General Conditions as indicated herein. All provisions which are not so added, deleted, or revised remain in full force and effect. Terms used in these Supplementary General Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

SGC 4.2 PHYSICAL CONDITIONS - SUBSURFACE AND EXISTING STRUCTURES. *Add* the following:

- C. In the preparation of the Contract Documents, the Engineer of Record has relied upon:
 - 1. Field measurements and visual inspection of the existing structures and surface conditions.

SGC 5.2 INSURANCE AMOUNTS. The limits of liability for the insurance required by Paragraph 5.2 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

- A. Workers' Compensation: (under Paragraph 5.2, C.1 of the General Conditions) as in accordance with AS 23.30.045:
 - 1. State: Statutory
 - 2. Applicable Federal (e.g., Longshore): Statutory

Note: If the WORK called for in the Contract Documents involves work in or on any navigable waters, the CONTRACTOR shall provide Workers' Compensation coverage which shall include coverage under the Longshore and Harbor Workers' Compensation Act, the Jones Act, and any other coverage required under Federal or State laws pertaining to workers in or on navigable waters.

- 3. Employers Liability
 - Bodily Injury by Accident: \$100,000.00 Each Accident
 - Bodily Injury by Disease: \$100,000.00 Each Employee
 - Bodily Injury by Disease: \$500,000.00 Policy Limit
 - a. CONTRACTOR agrees to waive all rights of subrogation against the OWNER and ENGINEER for work performed under Contract.
 - b. If CONTRACTOR directly utilizes labor outside of the State of Alaska in the prosecution of the WORK, "Other States" endorsement shall be required as a condition of the Contract.

- B. Commercial General Liability: (under Paragraph 5.2, C.2 of the General Conditions):
 - 1. Combined Single Limit
 - a. General Policy \$2,000,000.00 Each Occurrence
\$3,000,000.00 Annual Aggregate
 - b. Products/Completed Operations \$2,000,000.00 Each Occurrence
\$3,000,000.00 Annual Aggregate

SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

- c. Personal Injury \$2,000,000.00 Each Occurrence
- C. Commercial Automobile Liability: (under Paragraph 5.2, C.3 of the General Conditions) including Owned, Hired, and Non-Owned Vehicles:

Combined Single Limit, Bodily Injury and Property Damage \$1,000,000.00
- D. Policies shall also specify insurance provided by CONTRACTOR will be considered primary and not contributory to any other insurance available to the OWNER or the ENGINEER.
- E. All policies will provide for 30 Days written notice prior to any cancellation or nonrenewal of insurance policies required under Contract except in the event of no-payment of premium where 10 Days is permissible.
- F. The OWNER and the ENGINEER shall be named as an "Additional Insured" under all liability coverages listed in this Section, except for workers' compensation insurance. CONTRACTOR shall furnish OWNER a certificate from the insurer showing the OWNER as an Additional Insured within ten (10) days of the CONTRACTOR receiving the Notice to Proceed. Failure of the CONTRACTOR to fully and strictly comply with this Section shall constitute a default and a material breach of the Agreement and Contract documents.

SGC 14.9 FINAL PAYMENT AND ACCEPTANCE. *Add* the following paragraph:

- B. Prior to the final payment the CONTRACTOR shall contact the Alaska Department of Labor (ADOL) and provide the OWNER with clearance from the ADOL for the CONTRACTOR and all Subcontractors that have worked on the Project. This clearance shall indicate that all Employment Security Taxes have been paid. A sample letter for this purpose is provided at the end of this section.

SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

SGC 16.8 CERTIFIED PAYROLLS. *Change* paragraph A. to read:

- A. All CONTRACTORS or Subcontractors who perform work on a public construction contract for the OWNER shall file a certified payroll with Alaska Department of Labor. See Section 00830 - Alaska Labor Standards, Reporting, and Prevailing Wage Rate Determination.

Alaska Department of Labor
 Juneau Field Tax Office
 FAX 907-465-2374

From: _____

Subject: **Lift Station Generator Enclosure**

Timeframe of Contract _____

Please advise whether or not clearance is granted for the following CONTRACTOR or Subcontractor:

| | |
|------|---------|
| | |
| Name | Address |

Per AS 23.20.265 of the Alaska Employment Security Act, this request is for tax liability clearance and release to make final payment for WORK performed under the subject contract. Please send your response to:

Jeff Good, Borough Manager
 City & Borough of Wrangell
 PO Box 531
 Wrangell, Alaska 99929
 Telephone: (907) 874-2381
 Fax: (907) 874-3952

- () Tax Clearance is granted.
- () Tax Clearance is NOT granted.

Remarks: _____

Signature

Date

Title

SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

END OF SECTION

**SECTION 00830 - ALASKA LABOR STANDARDS, REPORTING, AND
PREVAILING WAGE RATE DETERMINATION**

State of Alaska, Department of Labor, Laborers' and Mechanics' Minimum Rates of Pay, AS 36.05.010 and AS 36.05.050, Wage and Hour Administration Pamphlet No. 600, the latest edition published by the State of Alaska, Department of Labor inclusive, are made a part of this contract by reference.

The CONTRACTOR is responsible for contacting the Alaska Department of Labor to determine compliance with current regulations.

Required Reporting During Contract (to be provided by every CONTRACTOR and Subcontractor):

- A. **Certified Payrolls must be submitted every two weeks. Before the second Friday**, each CONTRACTOR and Subcontractor must file Certified Payrolls with Statements of Compliance for the previous two weeks. If there was no activity for that pay period, indicate "**No Activity.**" Indicate "**Start**" on your first payroll, and "**Final**" on your last payroll for this Project. Send to:

| | | |
|--|-----|---|
| <i>Wage and Hour Section</i> Labor Law Compliance Division Alaska Department of Labor P.O. Box 020630 Juneau, AK 99802-0630 (907) 465-4842 | and | <i>Project Manager</i> City & Borough of Wrangell P.O. Box 531 Wrangell, AK 99929 (907) 874-3902 |
|--|-----|---|

- B. **Within 10 Days of "Notice of Award/Notice to Proceed"** make a list of **all** Subcontractors. Include their name, address, phone, estimated subcontract amount, and estimated start and finish dates. Send to:

| | | |
|---|-----|---|
| <i>Borough Clerk</i> City & Borough of Wrangell P.O. Box 531 Wrangell, AK 99929 (907) 874-2381 | and | <i>Wage and Hour Section</i> Labor Law Compliance Division Alaska Department of Labor P.O. Box 020630 Juneau, AK 99802-0630 (907) 465-4839/4842 |
|---|-----|---|

- C. As part of the **final payment request package**:

A completed Compliance Certificate and Release form (provided in Section 01700 - Project Closeout) from every CONTRACTOR and Subcontractor.

A final Subcontractor list complete with final subcontract amounts and including all equipment rentals (with operators).

A Completion of Public Project form from the Alaska Department of Labor.

END OF SECTION

**ALASKA DEPARTMENT OF LABOR
AND WORKFORCE DEVELOPMENT**

**EMPLOYMENT PREFERENCE DETERMINATION
(EFFECTIVE JULY 1, 2019)**

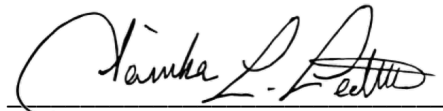
By authority of A.S. 36.10.150 and 8 ACC 30.064, the Commissioner of Labor and Workforce Development has determined the State of Alaska to be Zones of Underemployment. A Zone of Underemployment requires that Alaska residents who are eligible under AS 36.10.140 be given a minimum of 90 percent employment preference on public works contracts throughout the state in certain job classifications. This hiring preference applies on a project-by-project, craft-by-craft or occupational basis and must be met each workweek by each contractor/subcontractor.

For additional information about the Alaska resident hire requirements, contact the nearest Wage and Hour Office in Anchorage at 907.269.4900, in Fairbanks at 907.451.2886 or in Juneau at 907.465.4248.

The following classifications qualify for a minimum of 90 percent Alaska resident hire preference:

| | |
|--------------------------|--------------------------|
| Boilermakers | Mechanics |
| Bricklayers | Millwrights |
| Carpenters | Painters |
| Cement Masons | Piledriver Occupations |
| Culinary Workers | Plumbers and Pipefitters |
| Electricians | Roofers |
| Engineers and Architects | Sheet Metal Workers |
| Equipment Operators | Surveyors |
| Foremen and Supervisors | Truck Drivers |
| Insulation Workers | Tug Boat Workers |
| Ironworkers | Welders |
| Laborers | |

This determination is effective July 1, 2019, and remains in effect until June 30, 2021



Dr. Tamika L. Ledbetter, Commissioner

6/13/2019

Date

SECTION 00852 – PERMITS

PART 1 – GENERAL

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 00852 – PERMITS

END OF SECTION

SECTION 01 11 00

SUMMARY OF THE WORK

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Work covered by the Contract Documents.
 2. Work phases.
 3. Products ordered in advance.
 4. Owner-furnished products.
 5. Use of premises.
 6. Owner's occupancy requirements.
 7. Punchlist Completion.
 8. Work restrictions.
 9. Specification formats and conventions.

1.02 PROJECT IDENTIFICATION

- A. Project Name: Lift Station Generator Enclosure
Wood Street
Wrangell, Alaska 99929
- Owner: City and Borough of Wrangell
205 Brueger Street, P.O. Box 531
Wrangell, Alaska 99929
- B. Architect: Wold Architects and Engineers
332 Minnesota Street, Suite W2000
St. Paul, Minnesota 55101
- C. Civil Engineer: R & M Engineering Ketchikan, Inc.
355 Carlanna Lake Road, #200
Ketchikan, Alaska 99901
- D. Structural Engineer: PSM Engineers
2200 Sixth Avenue, #601
Seattle, Washington 08121
- E. Mechanical Engineer: Wold Architects and Engineers
332 Minnesota Street, Suite W2000
St. Paul, Minnesota 55101
- F. Electrical Engineer: Wold Architects and Engineers
332 Minnesota Street, Suite W2000
St. Paul, Minnesota 55101

1.03 SUMMARY OF THE WORK

Briefly and without force and effect upon the Contract Documents, the Work of this single prime Contract can be summarized as follows:

A. Work under this Contract includes:

1. Sitework
 - a. Site utilities: Electrical
 - b. Rough and finish grading.
 - c. Miscellaneous site improvements.
2. Building Structure
 - a. Concrete footings and concrete foundation walls, concrete slabs on grade.
3. Building Enclosure
 - a. Exterior wall systems of board and batten fiber cement siding.
 - b. Galvanized chain link fence and louver.
 - c. Roofing systems of composite shingle.
4. Mechanical Systems
 - a. Ventilation: As needed for Electrical Standby Generator.
 - b. Temperature control system.
5. Electrical Systems
 - a. Electrical: As needed for Electrical Standby Generator.
6. Keep Architect fully informed about progress of the work, performance of the work and potential problems.

1.04 WORK PHASES

- A. Start submittal process immediately upon contract award by the City of Wrangell. Actual work on site shall not commence until approved by City of Wrangell.

1.05 PRODUCTS ORDERED IN ADVANCE

- A. General: Owner has negotiated Purchase Orders with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Purchase Orders to Contractor. Costs for receiving, handling, storage if required, and installation of material and equipment are included in the Contract Sum.
1. Contractor's responsibilities are same as if Contractor had negotiated Purchase Orders, including responsibility to renegotiate purchase and to execute final Purchase-Order agreements.
- B. List of Products Ordered in Advance:
1. Electrical Standby Generator.

1.06 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
 - 1. Contractor is to visit site and be familiar with existing conditions. Contractor will be required to accept existing conditions on site prior to mobilizing.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Coordinate with the City of Wrangell the access to the site and maintaining 24/7 vehicle access to the Hospital and the adjacent sanitary sewer lift station.
 - 2. Public Streets: Maintain clear of automobile parking, equipment or material storage unless arrangements have been made with the appropriate jurisdiction.
 - 3. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.
- C. Do not allow construction waste and debris to accumulate; remove debris as it accumulates and, unless specified otherwise, dispose of legally off-site.
- D. Conform to City's noise control regulations, including limited hours of construction operations.

1.07 LAYING OUT WORK

- A. Locate all general reference points. Where dimensions or observed scope of work differ substantially from Drawings, notify Architect for decision.
- B. Lay out Work from the reference points furnished and be responsible for all lines, elevations, and measurements inside workspace. Exercise proper precaution to verify figures shown on Drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.
- C. Hire the services of a locator company to locate all privately owned utilities that may be disturbed by construction operations.
- D. Coordinate utility connections with municipality/utility company in which project is being constructed.

1.08 OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a punchlist for each specific portion of the Work to be occupied before Owner move in.
 - 2. Obtain a temporary Certificate of Occupancy if required from authorities having jurisdiction before Owner occupancy to install furnishings and equipment.

1.09 WORK RESTRICTIONS

- A. The Contractor shall limit access to grounds as indicated on Civil Drawings.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than seven (7) days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's or Owner's permission.

1.10 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Division and Sections using the 49-division format and CSI/CSC's "Master Format" numbering system.
 - 1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

END OF SECTION 01 11 00

SECTION 01 25 00

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1: GENERAL

1.01 DESCRIPTION

- A. This Section defines procedures to be followed to gain acceptance of products in the Work which are not listed in the individual specification sections. A two step process is required.
- B. Requests for acceptance for bidding purposes of alternative manufacturers is encouraged except where specifically prohibited by this Project Manual.
- C. Submit Prior Approval request via email to mail@woldae.com with the following information in the subject line: Prior Approval 216054 XX XX XX (Specification Section).

1.02 PRODUCT OPTIONS NOT REQUIRING PRE-BID SUBMITTAL

- A. Where a single manufacture is specified and acceptable manufacturer are also listed, acceptable manufacturers must provide an identical product or accept responsibility for all design implications when providing a product other than the specified product.
- B. Where products are specified by reference standards, any product established by a material testing agency to meet these standards is acceptable.
- C. Where multiple manufacturers and associated models are specified, select any one named.
- D. Where manufacturer(s) alone are specified, select any manufacturer and the product recommended in writing by the manufacturer as most suited to the application shown on the Drawings and Specifications.
- E. Where the phrase "or equal" follows the name of a manufacturer, any product which meets the performance and appearance standards established by the specified manufacturer may be selected, subject to the Architect's acceptance.
- F. Where a manufacturer is listed in both a technical specification section and the Interior Material Finish/Color Schedule, on Architectural Drawings and a color is provided.

1.03 PRODUCT SUBSTITUTIONS REQUIRING PRE-BID SUBMITTALS

- A. Step One - Manufacturers Acceptance
 - 1. Individual specification sections may be amended by the Architect during the bid period to include additional names of manufacturers determined to be capable of providing acceptable materials.
 - 2. To propose the names of specific manufacturers, submit, or arrange for suppliers to submit, written requests to Architect or appropriate Architect's Consultant. Requests received ten (10) calendar days prior to bid date will be considered.
 - a. Provide sufficient review data. Include specified manufacturer's model numbers and proposed manufacturer's product literature, noting product numbers for proposed substitutions, and where appropriate, samples and data relating to construction details. If the product is not identical to specified product, submit letter stating proposed manufacturer will custom make products to meet specified product.

- b. Architect's acceptance is based upon his determination that a manufacturer is capable of supplying acceptable materials. Approval is not assured or implied for a specific material, item of equipment, color or finish.
- c. Official notification will be by addendum to the Contract Documents. However, in addition, if letters of request are delivered in duplicate with accompanying stamped self addressed envelopes, copies may be returned with Architect's decision in advance.

B. Step Two - Product Acceptance

1. Upon award of a construction contract, accepted manufacturers may submit for review to the Architect through the General Contractor or Construction Manager, specific products, materials or equipment items as substitutes for those specified. Contractor to provide letter stating they will reimburse Architect to review substitutions.
2. Architect will review substitute products for performance, appearance, color, finish, size and suitability for inclusion in the work. If a substitute product is not accepted, submit another product by the same or other accepted manufacturer or provide the specified product.
3. Match specified colors and dimensions exactly, whether or not they are standard with the substitute product, unless a minor variation is accepted by the Architect.
4. If a substitute product is accepted, coordinate any necessary changes in other related work and pay for these changes. Pay cost of architectural or engineering services, if any, required to incorporate substitute products in the Work.

1.04 SUBSTITUTIONS BY CHANGE ORDER

- A. A substitution for a specified product may be permitted by "change order" at no additional cost to the Owner if product proposed is determined to be equivalent in performance and suitability, and if at least one of the following conditions apply:
1. Owner is given a credit for the work.
 2. Product is of superior quality than product specified.
 3. Product color or finish selection is preferable.
 4. Products specified and upon which building is designed have been discontinued by manufacturer.
- B. Provide Architect, through Owner, reasonable compensation for product evaluation.

END OF SECTION 01 25 00

SECTION 01 26 63

CHANGE ORDERS

1.01 CHANGE ORDER PROCEDURES

- A. Changes in the Project scope of work affecting the project cost can be made only through AIA Document G701 - Change Order.
- B. The procedures for processing changes in the scope of Work are listed as follows:
 - 1. The Architect prepares one of the following documents to modify the scope of work. Documents and attachments revising the drawings and specifications will be distributed electronically and the Contractor will be responsible for printing.
 - a. Supplemental Instructions (SI) which are used for no cost changes.
 - b. Proposal Request (PR) to be used for proposed changes that need written approval on cost prior to proceeding.
 - c. Construction Change Directive AIA Document G714 (CCD) which is used when the work must proceed immediately and time and material cost submitted as soon as possible for review by the Architect.
 - 2. The Contractor reviews and responds as follows:
 - a. Supplemental Instructions (SI): This no cost change is to be carried out in accordance with the following modifications to the contract documents described herein. If this change effects cost, do not proceed with this change. Notify the Architect in writing within 10 days of receipt that an itemized (labor and material) quotation will be submitted within 21 days of initial receipt of this Supplemental Instruction. If a cost is not submitted within 21 days, this Supplemental Instruction will be accepted at no additional cost.
 - b. Proposal Request (PR): Submit an itemized (labor and material) quotation for the proposed modifications to the contract documents as described herein within 21 days of receipt. If a cost is not submitted within 21 days, this Proposal Request can be accepted at no additional cost. Written approval is required prior to proceeding with this change.
 - c. Construction Change Directive AIA Document G714 (CCD): Proceed immediately to carry out this change in the contract documents as described herein. If this revision effects cost, submit an itemized (labor and material) quotation within 21 days of receipt. If a cost is not submitted within 21 days this Change Directive will be accepted at no additional cost.
 - 3. The Architect will review the Contractor's labor and material itemized quotation and respond in writing whether it is acceptable or needs revision. When all pricing is accepted by the Architect and Owner, a Change Order will be processed. Change Orders will be processed at increments determined by the Architect throughout the construction schedule.
- C. See General Conditions and Supplementary Conditions of the Work for methods of determining cost or credit, mark-up and schedule on submitting claims.

END OF SECTION 01 26 63

SECTION 01 31 19
PROJECT MEETINGS

PART 1: GENERAL

1.01 DESCRIPTION

- A. Schedule and administer pre-construction meeting, periodic progress meetings, and specially called meetings throughout the progress of the work.
 - 1. Notify Architect in advance.
 - 2. Prepare agenda for meetings.
 - 3. Make physical arrangements for meetings.
 - 4. Preside at meetings.
- B. Representatives of contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and the construction schedules.

1.02 PRE-CONSTRUCTION MEETING

- A. Schedule within 15 days after date of Notice to Proceed.
- B. Location: A central site or electronic virtual platform, convenient for all parties, designated by Contractor.
- C. Attendance:
 - 1. Owner's representative.
 - 2. Architect and their professional consultants.
 - 3. Resident project representative.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
 - 6. Major suppliers.
 - 7. Others as appropriate.
- D. Suggested Agenda:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected construction schedules Refer to Section 01 32 00.
 - Critical Path Method. Schedule for entire construction period.

- Submittal Schedule.
 - Schedule pre-scheduling conference.
2. Critical work sequencing.
 3. Major equipment deliveries and priorities.
 4. Project coordination and scheduling:
 - Designation of responsible personnel.
 - Pre-installation conference:
 - Roofing.
 5. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal Requests/Supplemental Instructions.
 - c. Submittals.
 - 1) Mechanical and electrical coordination drawings.
 - d. 21 day time limit on claims.
 - e. Change orders.
 - f. Applications for payment.
 6. Adequacy of distribution of Contract Documents.
 7. Procedures for maintaining Record Documents.
 8. Use of premises:
 - a. Office, work, and storage areas.
 - b. Owner's requirements.
 9. Steel fabrication certification. Refer to Section 05 12 00 – 1.06 B, C.
 10. Construction facilities, controls and construction aids.
 11. Temporary utilities.
 12. Safety and first-aid procedures.
 13. Security procedures.
 14. Housekeeping Procedures. Refer to Section 01 50 00.
 - Debris removed weekly.
 - Daily clean requirements.
 - Failure to maintain clean site will result in Owner cleaning and back charging Contractor.

15. Final Cleaning. Refer to Section 01 74 00.

- Schedule in time for Owner to complete furniture installation, required clean (i.e. floors).
- Any cleaning done by Owner due to unacceptable cleaning by Contractor, or to and contractor in completing cleaning on schedule will be back charged to Contractor.

1.03 PROGRESS MEETINGS

A. Schedule regular periodic meetings, as required.

B. Hold called meetings as required by progress of the work.

C. Location of the meetings or electronic virtual platform: The project field office of the Contractor.

D. Attendance:

1. Architect and their professional consultants may attend as needed.
2. Subcontractors as appropriate to the agenda.
3. Suppliers as appropriate to the agenda.
4. Others.

E. Suggested Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Plan progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Review proposed changes for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the Project.
13. Other business.

END OF SECTION 01 31 19

SECTION 01 31 26

ELECTRONIC COMMUNICATION PROTOCOLS

PART 1: GENERAL

1.01 SUMMARY

- A. The Architect will provide the Contractor with one (1) electronic copy of the background drawing relevant to their request. Requested files will be provided via email to the Contractor in AutoDesk AutoCAD format.
- B. The terms and conditions on the attached form “Agreement Between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media” apply to all Electronic Documents issued by Wold Architects and Engineers or it’s consultants for the project.
 - 1. Exceptions:
 - a. Electronic Documents by Structural Engineer, PSM Engineers, will need to sign an additional Agreement for Electronic File Transfer that can be made available upon request.
 - b. Electronic Documents by Civil Engineer, R&M Engineering Ketchikan, will need to sign an additional Agreement for Electronic File Transfer that can be made available upon request.
 - c. Electronic Documents by other consultants on the project may need to sign an additional Agreement for Electronic File Transfer that can be made available upon request.
- C. Electronic Document Availability
 - 1. Pre Bid: AutoCAD backgrounds pertaining only to Survey and/or proposed grading will be available prior to bid. Requesting Contractors must complete “Attachment A - Agreement Between Civil Engineer and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media” at time of request.
 - 2. After Bid: Backgrounds as requested by the awarded contractors at the discretion of the Architect or Engineer. Electronic Documents are available upon completion of “Attachment A - Agreement Between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media” by the General Contractor on project.
- D. See attached form “Attachment A – Agreement Between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media.”

PART 2: PRODUCTS – (Not Applicable)

PART 3: EXECUTION – (Not Applicable)

END OF SECTION 01 31 26

ATTACHMENT A – AGREEMENT BETWEEN ARCHITECT AND CONTRACTOR FOR THE TRANSFER OF COMPUTER AIDED DRAFTING (CAD) FILES ON ELECTRONIC MEDIA

LIFT STATION GENERATOR ENCLOSURE

The purpose of this agreement is to grant permission from the Transmitting Party (Architect and/or Engineer) to the Receiving Party (Contractor, Bidder, and/or Construction Manager) for the Receiving Party’s use of Electronic Media on the Project, and to set forth the terms of such use. Electronic Media is defined to include all data or files transmitted. All Electronic Media is considered confidential and containing business proprietary information. Wold Architects & Engineers and its consultants grant the Receiving Party a limited license to use Electronic Media issued by Wold Architects & Engineers exclusively for this Project. The terms are set forth as follows:

1. The Electronic Media is transmitted for the Receiving Party’s convenience and remains the sole property of Wold Architects and Engineers and/or its consultants.
2. The Transmitting Party makes no warranty, expressed or implied, including warranties of merchantability or fitness for a particular purpose, respecting the Electronic Media or the files therein. The Transmitting Party makes no representation regarding the accuracy, completeness, or permanence of the Electronic Media or the files therein.
3. The Electronic Media or files therein depict information only at the specific point in time of preparation and may not include final data or represent exact as-built conditions. Addenda information or revisions made after the date indicated on the files may not have been incorporated. The Receiving Party is solely responsible for verifying all field conditions against the Electronic Media or files therein and making all necessary adjustments. The Receiving Party is solely responsible for determining whether any changes made after it receives the Electronic Documents affect any services or work it provided using the Electronic Documents and for updating any such services or work.
4. The Electronic Media and files therein are not considered to be Contract Documents as defined by the General Conditions of the Contract for Construction. In the event of a conflict between the Architect’s and/or Engineer’s sealed Contract Drawings and the Electronic Media files, the sealed Contract Drawings shall govern. It is the Receiving Party’s responsibility to determine if any conflicts exist.
5. Neither Wold Architects and Engineers nor its consultants are responsible for any decline in accuracy or readability due to the medium on which the Electronic Media are stored, or for any unintentional transmission of computer viruses.
6. The Electronic Media and the files therein may not be used by the Receiving Party for any purpose other than as a convenience in the preparation of Shop Drawings, layout, and other purposes related to the Project. Any use or reuse of the Electronic Media of the files therein, by the Receiving Party or others, are at the Receiving Party’s sole risk and without liability or legal exposure to the Architect, Engineers, or their consultants.
7. The Architect reserves the right to determine what content will be distributed to the Receiving Party.

By signing below, the Receiving Party agrees to the terms set for by this Agreement.

AUTHORIZED ACCEPTANCE:

By Receiving Party/Contractor of Record

Signature

Print Name and Title

Print Name of Company

Date

SECTION 01 32 00

CONSTRUCTION SCHEDULING

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's Construction (CPM) Schedule.
 2. Shop Drawing Submittals Schedule
 3. CPM Reports

1.02 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 2. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
1. Float time is for the exclusive use or benefit of the Contractor to meet schedule milestones and Contract completion date.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or a similar significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.03 SUBMITTALS

- A. Submittals Schedule: Submit six copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Architect's final release or approval. (Assume 15 working day turnaround.)
 - 7. Identify submittals that effect critical path.
- B. Contractor's Construction (CPM) Schedule: Submit two printed copies of initial schedule large enough to show entire schedule for entire construction period.
- C. CPM Reports: Concurrent with CPM schedule, submit three printed copies of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, early start date, early finish date, late start date, late finish date, and total float.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

1.04 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to review methods and procedures related to the Contractor's Construction (CPM) Schedule, including, but not limited to, the following:
 - 1. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
 - 2. Review delivery dates for Owner-furnished products.
 - 3. Review schedule for work of Owner's separate contracts.
 - 4. Review time required for review of submittals and resubmittals.
 - 5. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 6. Review time required for completion and startup procedures.
 - 7. Review and finalize list of construction activities to be included in schedule.
 - 8. Review submittal requirements and procedures.
 - 9. Review procedures for updating schedule.

1.05 COORDINATION

- A. Coordinate requirements in this Article with "Submittals Schedule" Article in Part 2. If a submittal review sequence policy governs, revise this Article to comply with requirements. See Evaluations for discussion on submittal review sequence policies.

PART 2: PRODUCTS

2.01 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates. Identify items that affect critical path.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using CPM (critical path method) format.

- B. Preliminary Network Diagram: Submit diagram within 14 days from the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted prior to first pay request.
 - 2. Establish procedures for monitoring monthly and updating CPM schedule if work is not on schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 3. Use "one workday" as the unit of time. Activities should not be shorter than 2 work days or longer than 10 work days for projects with a construction period over 6 months and/or longer than 5 work days for projects with a construction period under 6 months.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Purchase of materials.
 - c. Delivery.
 - d. Fabrication.
 - e. Installation.
 - 2. Processing: Process data to produce output data or a computer-drawn, logic network diagram. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

PART 3: EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating:
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00

SUBMITTALS

PART 1: GENERAL

1.01 DESCRIPTION

- A. This Section defines procedures for the following submittals required by the Contract Documents.
- B. Provide submittals as noted in each Section.
- C. Allow for two weeks review of submittals to avoid delay of Work.
- D. Include with submittal preparation, field verifications of measurements, field construction criteria, verification of catalog numbers and similar data, and coordination of Work requirements and Contract Documents.
- E. Submit all color samples within 45 days of contract award for Architect's use in color selections. The Architect will not start the color schedule until all samples are received.

PART 2: REQUIRED SUBMITTALS

2.01 SHOP DRAWINGS AND SAMPLES

- A. Submit shop drawings in accordance with Article 3 of the General Conditions and the following.
 - B. Prepare clearly identified shop drawings or schedules to this specific project, containing only data applicable. Include with the shop drawings or schedules a letter of transmittal listing and dating the submitted drawings in sets.
 - C. Contractor to review all submittals prior to submittal to Architect, and indicate such review with a stamp and signature. Review submittals for conformance to Drawings, Specifications, coordination with other trades and adjacent construction and verification of field dimensions. Failure of Contractor to adequately review submittals shall be cause for rejection.
 - D. Prepare and submit electronically (with exception for color charts and samples) to Architect for review, all shop drawings and manufacturers catalog sheets showing illustrated cuts of items to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams, weights and arrangements. Each submittal to include a transmittal on contractor letterhead. Submittal to be in the form of one combined PDF, professionally assembled so all documents are facing the same way.
 - 1. The Contractor will provide submittals labeled as follows:
 - a. 216054, LIFT STATION STANDBY GENERATOR ENCLOSURE,
XX-XX-XX-X [SPECIFICATION # AND CONSECUTIVELY NUMBERED SUBMITTAL]
_____ [SPECIFICATION NAME] _____ [SUBMITTAL NAME].
- [\[Example: 142118, JHS, 04 20 00-1, Non-Bearing Masonry – Masonry Accessories\]](#)
- E. Reproduction or exact replication of contract documents are not an acceptable form of shop drawings. Contractor is to generate shop drawings based on the information identified in the contract documents and notify the architect of discrepancies in the documents.
 - F. The Architect will take one of the following actions on submittals:
 - 1. “Reviewed”: Contractor shall proceed with ordering and/or fabrication.

2. "Review Comments": Contractor shall proceed with ordering and/or fabrication after taking into account noted comments.
 3. "Rejected": Contractor shall provide a submittal that meets the intent of the specifications.
 4. "Revise and Resubmit": Contractor shall modify submittal to address comments and resubmit.
- G. If equipment other than that used in the design of this project is proposed to be used, the Contractor and/or supplier shall verify electrical differences, dimension variations and weight increases. The Contractor shall be responsible for any extra costs incurred as a result of equipment substitutions.
- H. Information submittals and submittals that are not required shall be for Architects' and Engineers' use and be available for the design team's review at the jobsite. Quantity of submittals will be the same for Architect as noted under shop drawings. These submittals will not be reviewed, stamped or returned to the Contractor.
- I. Unless otherwise specified, submit to the Architect's office samples of size, and nature representing typical qualities. Where required, submit a sufficient number of samples to demonstrate the complete range of variations of the material or quality. Written acceptance of the Architect is required prior to ordering any item for which samples are required.
- J. Submit samples to Architect's office, securely packaged, with the name of the Project clearly indicated on the package exterior. Each physical sample shall have a label or tag, firmly attached to the sample, bearing the following information: (a) Name of Project, (b) Name of Supplier, (c) Name of Contractor, and (d) Product information such as manufacturer's designation, finish, type, class, grade, etc. as is appropriate. The Architect will retain one copy of each sample.

2.02 LIST OF MATERIALS

- A. Within 7 days after the award of the Contract (notice to proceed or letter of intent), submit 4 copies of a complete list of all material, products, and equipment proposed to be used in construction to the Architect for acceptance. Do not order materials until the proposed listed materials, products and equipment to be used in construction are accepted by the Architect.
- B. Where two or more makes or kinds of items are named in the specifications (or additional names are called for in addenda), the Contractor shall state which particular make or kind of each item they proposes to provide. If the Contractor fails to state a preference, the Owner shall have the right to select any of the makes or kinds named without change in price.
- C. This list shall be arranged generally in order of specification sections. The items listed shall fully conform to project requirements and specifications. All materials are subject to the Architect's acceptance. After acceptance, changes or substitutions will not be permitted.
- D. Clearly identify or list the material, product or equipment by manufacturer and brand by listing the names for all items, including those where only one material or product is specified. Each and every material, product and equipment shall be specifically named, not listed "as specified".

2.03 LIST OF SUBCONTRACTORS

- A. Refer to the General Conditions of the Contract for Construction.
- B. Propose use of subcontractors or sub-subcontractors who are established, reputable firms of recognized standing with a record of successful and satisfactory past performance. Include the following information: specification section, item of work, subcontractor or supplier, material/manufacturer (as specified will not be allowed), project manager, phone and facsimile numbers. List major sub-subcontractors for mechanical and electrical work. Use only those subcontractors (and sub-sub-contractors, when appropriate) who are acceptable to the Architect and Owner on the Work.

2.04 SCHEDULE OF VALUES

A. Requirements

1. Submit separate Schedule of Values for each building or phase to Architect ten (10) days prior to first Application For Payment (AIA Form G702, G702a).
2. Use Schedule of Values only as basis for Contractor's Application For Payment.

B. Form of Submittal

1. Base format on Sections listed in Section 00 01 10 Table of Contents, as well as, the Mechanical and Electrical Table of Contents. Break down labor and material separately.
2. Provide a separate line item on the schedule of values for coordination drawings as defined in Division 23 Specification Section 23 05 00 "Common Work Results for HVAC".
3. Round off amounts to nearest ten dollars.

2.05 PROGRESS SCHEDULE

- ### **A.**
- Refer to the General Conditions of the Contract for Construction and Section 01 32 00 Construction Scheduling for submittal requirements.

END OF SECTION 01 33 00

SECTION 01 45 16

QUALITY CONTROL

PART 1: GENERAL

1.01 SELECTION AND PAYMENT

- A. The Owner will select, hire, pay for services of an independent testing laboratory, to perform specified Field Quality Control and other inspections, test of materials and construction called for in the Specifications.

1.02 RESPONSIBILITY OF CONTRACTOR

- A. Be responsible for furnishing materials and construction in full conformance with Plans and Specifications.
- B. Pay for all tests, conducted by the testing laboratory that fail and also pay for all scheduled tests for which the pours are cancelled and a test field crew is on site before that particular pour is cancelled.

1.03 COOPERATION OF CONTRACTOR

- A. Contractor: Cooperate with the Laboratory, and:
 - 1. Make available, without cost, samples of all materials to be tested in accordance with applicable standard specifications.
 - 2. Furnish such nominal labor and working space as is necessary to obtain samples at the Project.
 - 3. Advise Laboratory of the identity of material sources and instruct the suppliers to allow test or inspections by the Laboratory.
 - 4. Notify Laboratory sufficiently in advance of operations to allow completion of initial tests or inspections by the Laboratory.

1.04 REJECTION OF MATERIALS/INSTALLATION

- A. Laboratory: Notify the Owner, Architect Engineer and Contractor or his authorized representative of any materials or installation which are not in full conformance with the specifications.

1.05 FILING OF REPORTS

- A. Laboratory: File a copy of the inspection report with the Architect, appropriate Architect's Consultant, Owner and Building Official.

PART 2: PRODUCTS – Not Applicable.

PART 3: EXECUTION

3.01 GENERAL SCOPE OF TESTING, INSPECTION

- A. Require laboratory to conduct tests and inspections as directed by the Owner, Architect or Engineer.
- B. Refer to individual specification sections for test requirements.

3.02 QUALIFICATION TESTING

- A. In addition to tests specified, if a product, material, or method of assembly that is of unknown or questionable quality to Architect, the Architect may require and order suitable tests to establish a basis for acceptance or rejection. Pay for these tests. "Standard" test reports or reports on "similar" material will not be accepted.

3.03 MISCELLANEOUS (REGULATORY) INSPECTIONS

- A. Should specifications, Architect's instructions, laws, ordinances or any public authority require any work to be inspected or approved, Contractor shall give timely notice of its readiness for inspection and a reasonable date fixed for such inspection. If any work should be covered up without approval or consent of approving agency, or Architect, it must be uncovered for examination at Contractor's expense.

END OF SECTION 01 45 16

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Support facilities include, but are not limited to, the following:
 - 1. Project identification and temporary signs.
 - 2. Housekeeping and waste disposal facilities.
 - 3. Storage and fabrication sheds.
 - 4. Lifts and hoists.
 - 5. Construction aids and miscellaneous services and facilities.
 - 6. Temporary power and lighting.
- C. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Pest control.
 - 5. Site enclosure fence.

1.02 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather-tight; exterior walls are insulated and weather-tight; and all openings are closed with permanent construction or substantial temporary closures.

1.03 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Architect.
 - 2. Testing agencies.
 - 3. Personnel of authorities having jurisdiction.
- B. Temporary Water Service: Pay water service permits, connection charges, pumps, pipe, hoses and use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.
 - 1. Coordinate with governing municipalities for location of nearest water supply.
- C. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.
- D. Coordinate with governing municipal for location of nearest water supply.

PART 2: PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials or undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- C. Lumber and Plywood: Comply with requirements in Division 6 Section "Carpentry."
- D. Paint: Comply with requirements in Division 9 Section "Painting."
- E. Water: Potable.

2.02 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- E. Temporary power and lighting, refer to Div. 26.

PART 3: EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Coordinate with appropriate local utility company to install temporary service if required.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - a. Pay for utility charges.

- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel as required by government jurisdictions.
 3. Provide Hand Sanitizing stations for use by all contractors as well as Architect and their consultants. Locate Hand Sanitizing stations at point of access into building.
 4. Provide all necessary items and procedures to meet guidelines as recommended by the Center for Disease Control and Prevention (CDC) and the State's Health Department.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.
- B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 33 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations and provide access to and throughout the site as required to complete the work/fire department access.
- D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section for progress cleaning requirements.
1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
 2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

F. Housekeeping

1. Do not allow debris to accumulate on-site or within the building work areas. The contractor shall implement and provide the following cleaning services:
 - a. Failure to maintain a clean construction area may result in the Owner cleaning the site and back-charging the Contractor.
 - b. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.

G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

H. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest-control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Engage this pest-control service to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

D. Site Enclosure Fence: Before construction operations begin, install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.

1. Drive fence posts in existing soil of gravel and earth.
2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

F. Food Consumption: Limit food and soft drink consumption to within the Contractor's trailer or out of the building.

- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- H. Temporary Dust Control Partitions: Refer to Construction Dust Control Section 01 56 00.
- I. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses as required by the local fire marshal.
- J. Existing Monument Sign: The existing Monument Sign is to remain place during construction. Protective measurements are to be taken to not damage the sign during construction. Damage to the sign will be the responsibility of the Contractor to repair and/or replace to the satisfaction of the City of Wrangell.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 73 29
CUTTING AND PATCHING

PART 1: GENERAL

1.01 DESCRIPTION

- A. Execute cutting, fitting or patching of Work, required to:
 - 1. Make several parts fit properly.
 - 2. Uncover Work to provide for installation of ill-timed Work.
 - 3. Remove and replace defective Work.
 - 4. Remove and replace Work not conforming to requirements of Contract Documents.
 - 5. Install specified Work in existing construction.
 - 6. Provide finished surfaces (to match adjacent existing surfaces) to fill in voids caused by removal or replacement of materials.
- B. Pay for costs caused by ill-timed or defective Work, or Work not conforming to Contract Documents, including costs for additional services of Architect/Engineer.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Replacement of Work Removed: Comply with specifications for type of Work to be done.
- B. Placement of Work to fill Voids caused by Removal: Comply with latest industry standards for type of Work to be done.

PART 3: EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during:
 - 1. Cutting and patching.
- B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide shoring, bracing and support as required to maintain structural integrity of Project.
- B. Provide protection for other portions of Project.
- C. Provide protection from elements.

3.03 PERFORMANCE

- A. Neatly cut or demolish along straight, true, square lines.
- B. Execute cutting and demolition by methods which will prevent damage to other Work, and will provide proper surfaces to receive installation of repairs and new Work.
- C. Restore Work which has been cut or removed; install new products to provide complete Work in accordance with requirements of Contract Documents.
- D. Refinish entire surfaces as necessary to provide an even finish.
 - 1. Continuous Surfaces: To nearest intersections.
 - 2. Assembly: Entire refinishing.

END OF SECTION 01 73 29

SECTION 01 74 00

FINAL CLEANING

PART 1: NOT USED

PART 2: PRODUCTS

2.01 CLEANING MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3: EXECUTION

3.01 FINAL CLEANING

- A. Employ experienced workers or professional cleaners for final cleaning.
- B. At completion of construction and just prior to acceptance or occupancy, conduct a final inspection of exposed interior and exterior surfaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.
- D. Repair, patch and touch up marred surfaces to match adjacent finishes.
- E. Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Maintain cleaning until the Building or portion thereof, is occupied by the Owner.

END OF SECTION 01 74 00

SECTION 01 77 00

PROJECT CLOSEOUT

PART 1 GENERAL

1.01 SUBSTANTIAL COMPLETION

- A. Refer to the General Conditions of the Contract for Construction.
- B. When the Project is determined by the Architect to be sufficiently complete to permit utilization for the intended use, the Architect will issue a Certificate of Substantial Completion.
- C. To receive the Certificate of Substantial Completion, perform the following:
 - 1. Submit to the Architect a notice declaring that work is believed to be substantially complete.
 - 2. Submit a list of work items that remain to be completed or corrected and the date this work will be accomplished.
 - 3. Obtain Occupancy certificate when required from governing municipality.
- D. Architect will visit the project to evaluate the request for issuance of a Certificate of Substantial Completion.
 - 1. If the Architect concurs that the Project is substantially complete, the Architect will deliver a Certificate of Substantial Completion and a list of work items necessary for completion or correction prior to request for inspection for final completion.
 - 2. If the Architect determines that the work is not substantially complete, the Architect will deliver to the Contractor a written statement including reasons.
 - 3. Complete work on the items required by the Architect for achieving substantial completion and make additional written requests for issuance of a Certificate of Substantial Completion until the Architect determines that sufficient Work has been performed.

1.02 FINAL INSPECTION

- A. When the Work is considered complete, submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been completed and inspected by the Contractor for compliance with Contract Documents and is ready for final inspection.
 - 3. Building Permit Final has been submitted.
- B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Architect consider that the Work is incomplete or defective:
 - 1. Architect will notify the Contractor in writing, listing the incomplete or defective work.
 - 2. Take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.
 - 3. Architect will reinspect the Work.

- D. When the Architect finds that the Work is acceptable under the Contract Documents, they will request preparation of closeout submittals.

1.03 REINSPECTION FEES

- A. Should Architect 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 Architect for such additional services.
 2. Owner will deduct the amount of such compensation from the final payment.

1.04 CLOSEOUT SUBMITTALS TO ARCHITECT

- A. When the Architect has determined that the Construction Work is acceptable under the Contract Documents and the Contract fully performed, prepare and submit final Application for Payment to the Architect together with one original and one copy of the following:
1. A letter recommending acceptance of the Project and indicating all punch list items are complete.
 2. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706, with bonds for any exceptions.
 3. Consent of Surety to Final Payment on Consent of Surety Company to Final Payment, AIA Document G707.
 4. Contractors Affidavit of Release of Liens, AIA Document G706A.
 5. Project Record Documents, if required.
 6. Warranties and Bonds.
 7. Documentation from Building Official that building permit has been closed out.

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Architect.
- B. Statement shall reflect all adjustments to the Contract Sum:
1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices
 - d. Deductions for uncorrected Work
 - e. Penalties and Bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for reinspection payments and costs incurred by Architect or Architect's Consultants if project is not closed out within sixty (60) days of Substantial Completion.

- h. Other adjustments
- 3. Total Contract Sum, as adjusted.
- 4. Previous payments.
- 5. Sum remaining due.
- C. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract Sums which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

- A. Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATING, MAINTENANCE AND WARRANTY DATA

1.01 GENERAL

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
- B. Prepare operating, maintenance and warranty data as specified in this Section and as referenced in other pertinent section of Project Manual.
- C. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.02 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel with the following qualifications:
 - 1. Trained and experienced in maintenance and operation of the described products.
 - 2. Completely familiar with requirements of this Section.
 - 3. Skilled as a technical writer to the extent required to communicate essential data.
 - 4. Skilled as a draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by the Owner's personnel.
- B. Format shall conform to the following:
 - 1. Size: 8½" x 11".
 - 2. Paper: 20 pound minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Drawings
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to the size of the text pages.
 - 5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
 - 6. Cover: Identify each volume with typed or printed title "OPERATING, MAINTENANCE AND WARRANTY INSTRUCTIONS". List:
 - a. Title of Project
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.

C. Binders

1. Commercial quality three-ring binders with durable and cleanable plastic cover.
2. Maximum ring size: 2 inch.
3. When multiple binders are used, correlate the data into related consistent groupings.

D. Digital Format: Submit one PDF copy of the O&M Manual on a DVD Disk.

1.04 CONTENT OF MANUAL

A. Arrange neatly typewritten table of contents for each volume, in the following systematic order.

1. Contractor, name of responsible principal, address and telephone number.
2. A list of each product required to be included, indexed to the content of volume.
3. List, with each product, the name, address and telephone number of:
 - a. Contractor or installer.
 - b. Maintenance contractor, as appropriate.
 - c. Identify the area of responsibility of each.
 - d. Local source of supply for parts and replacement.
 - e. Include warranty information as specified.
4. Identify each product by product name and other identifying symbols such as set in Contract Documents.

B. Product Data

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:
 - a. Clearly identify the specific product or part installed.

C. Content, for moisture-protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.
 - a. Applicable standards
 - b. Chemical composition
 - c. Details of installation
2. Instructions for inspection, maintenance and repair.

D. Additional requirements for maintenance data: The respective section of the Project Manual.

1.05 SUBMITTAL SCHEDULE

- A. Submit one copy of completed data in final form within thirty days of substantial completion. Copy will be returned with comments.
- B. Submit two copies of approved data in final form ten (10) days after comments are received.

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

1.01 GENERAL

- A. Fully cooperate with the Architect to accomplish the following.
- B. These requirements supplement the requirements set forth in the General Conditions.
- C. Maintain at each site one record copy, as applicable, of:
 - 1. Drawings and Details with addenda marked in.
 - 2. Specifications with addenda marked in.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Architect/Engineer Supplemental Instructions, Proposal Requests or written instructions.
 - 6. Approved shop drawings, product data and samples.
 - 7. Field test records.

1.02 MAINTENANCE OF RECORD DOCUMENTS AND SAMPLES

- A. Store record documents and samples in Contractor's field office in files and racks. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with the Construction Specifications Institute MASTERFORMAT.
- C. Maintain record documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make record documents and samples available at all times for inspection by Architect or Owner.

1.03 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Continuously record information and changes.
- C. Drawings: Legibly mark to record actual construction.
 - 1. Depths of various elements of foundation in relation to finish first floor datum.
 - 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 4. Field changes of dimension and detail.

5. Changes made by Field Order or by Change Order.
 6. Details not on original contract drawings.
- D. Specifications and Addenda - Legibly mark each Section to record:
1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.
 2. Changes made by Field Order or by Change Order.
- E. Shop Drawings – Label each set by corresponding specification section. At the completion of the project, provide the Owner with one complete set, reviewed and stamped by architect, organized by specification section in the following formats:
1. Paper (various sizes) folded to 8 1/2" x 11" and boxed with project name and completion date clearly labeled on exterior.
 2. Scanned PDF copy on a compact disk, ordered by specification section.

1.04 SUBMITTAL

- A. Deliver Record Documents to the Owner at contract close-out.
- B. Accompany submittal with transmittal letter in duplicate, containing:
1. Date
 2. Project title
 3. Title and number of each Record Document

END OF SECTION 01 78 39

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Recording of training sessions.

1.02 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit one complete training manual for Owner's use.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
- E. Demonstration and Training via Digital Media: Submit one copy at end of each training module.

1.03 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.04 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 – PRODUCTS

2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training through Architect with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

E. Demonstration and Training Recording: Record each training module separately on digital, window's compatible digital media. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.03 REQUIRED DEMONSTRATION AND TRAINING

A. The following is a list of demonstration and training requirements to meet manufacturer recommendations or as outlined by SEARHC contracted commissioning agent. Inconsistencies or omissions from the list does not relieve the Contractor from providing required demonstration and training delineated in each specification section.

1. Roofing – As required
2. Exterior Materials – As required

3.04 REQUIRED DEMONSTRATION AND TRAINING

A. The following is a list of demonstration and training requirements listed in individual Mechanical, Electrical, Plumbing, and Fire Protection specification sections. Inconsistencies or omissions from the list does not relieve the Contractor from providing required demonstration and training delineated in each specification section.

1. Section 26 32 13 Engine Generators* 8 Hours

3.05 DEMONSTRATION

A. Manufacturer's onsite field technician shall demonstrate the operation of the doors to the Owner. A video outlining the operation of the item or system, scheduled maintenance, basic troubleshooting and care of the item or system shall be provided to the Owner by the door manufacturer. Refer to Section 01 79 00 Demonstration and Training.

END OF SECTION 01 79 00

SECTION 05 50 00

METAL FABRICATIONS

PART 1: GENERAL

1.01 SUMMARY

- A. Section includes: All labor, material necessary to complete all items of miscellaneous metal as listed on the schedule in Part 2 and shown on the Drawings.
1. The design, fabrication, transportation to the project site, and associated operations required to complete miscellaneous metals, including all the various metal items manufactured to more or less standard details in sizes conforming to specific requirements of the project.
 2. Steel Framing and Supports for mechanical and electrical equipment.
 3. Steel Framing and Supports for applications where framing and supports are not specified in other sections
 4. Metal Bollards
- B. Products furnished, but not installed under this section include the following:
1. Anchor bolts, steel pipe sleeves

1.02 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
1. Shop drawings required for all items. Show all work to be fabricated with all construction details shown in appropriate scale, methods of attachment to other materials, finished dimensions, shop welds and grinding of welds, field assembly joints, etc. Indicate welded connections, including net weld lengths, using standard AWS welding symbols.
 2. Calculations: Accompany shop drawings with a complete structural design and analysis prepared and certified by a Professional Engineer (P.E.) licensed in the State in which the project is located. The design and analysis shall show all design loads, reactions, forces or stresses, and structural characteristics of members and connections for the items listed in section 2.01.B. Include a certified letter stating that shop drawings as submitted conform to the requirements on the design calculations.
 3. Coordinate work with other suppliers and subcontractors; obtain their approved shop drawing where necessary, or obtain any necessary additional detail information regarding mounting conditions or other aspects of related work.

1.03 PRODUCT PROTECTION

- A. Package, handle, deliver and store at the job site in a manner that will avoid damage or deformation. Damaged material will be rejected.
- B. Furnish items to be built into concrete, masonry, carpentry, etc. as the work progresses.

1.04 JOB CONDITIONS

- A. Verify dimensions in field, as required, for pre-cut or prefabricated items.
- B. Examine job conditions and adjoining construction which may affect the acceptability of the work.

PART 2: PRODUCTS

2.01 DESIGN

- A. All materials shall be free from defects impairing strength, durability, appearance, and shall be of the best commercial quality for the purposes indicated. Structural properties shall be such to withstand safely all strains and stresses to which they will be normally subjected.
- B. The maximum Live Load deflection shall be $L/360$. Deflection determined based on structural section(s) alone.

2.02 MATERIALS

- A. Fastenings: Bolts, welds, rivets or other fastenings as required.
- B. Anchor Bolts, Nuts: ASTM F1554, Grade 36.
- C. Steel Pipe: ASTM A53, Grade B.
- D. Steel Tubing: ASTM A500 Grade B.
- E. Shop Paint Primer: Manufacturer's standard rust inhibiting primer.
- F. Galvanizing: ASTM A123.
- G. Expansion and Adhesive Anchors.
 - 1. Wedge Anchors: Hilti "Kwik Bolt II" or Ramset/Redhead "Trubolt" or equal.
 - 2. Heavy Duty Sleeve Anchors: Hilti "HSL" or equal.
 - 3. Adhesive Anchors: Hilti "HVA" or "HIT", Ramset/Redhead "EPCON" or equal.

2.03 GENERAL REQUIREMENTS FOR FABRICATION

- A. Weld permanent connections wherever possible; use continuous welds where exposed and grind smooth, straighten members after welding.
- B. Perform welding in accordance with AWS D1.1.
- C. Perform shop cutting, drilling, fitting and assembly wherever possible. Take field measurements before fabrication when required.
- D. Provide all supporting members, fasteners, framing, hangers, bracing, brackets, straps, bolts, angles, etc. required to set, connect the work rigidly and properly to other construction.
- E. At all areas of exposed steel that is to receive a finish:
 - 1. Piece marks hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
 - 2. Mill mark removal: Deliver steel with no mill marks (stenciled, stamped, raised, etc) in exposed locations. Omit mill marks by cutting of mill material to appropriate lengths where possible. Where not possible, fill and/or grind to a surface finish consistent with the adjacent material.

2.04 SHOP COATS PROTECTIVE TREATMENT

- A. Clean free of all mill scale, rust and foreign matter by wire brushing, scraping, sandblasting or flame cleaning. Remove grease, oil with solvent. Dust, dirt: Remove with air blast or brush.
- B. Apply one shop coat of specified primer to all ferrous metal products, except galvanized. Provide primer for field touch up. Be responsible for quality and adhesion of shop prime finish.
- C. Hot-dip galvanize all ferrous metal items exposed to weather in the finish work and shop prime with primer recommended for use on galvanized metal.

2.05 SCHEDULE OF MISCELLANEOUS METAL ITEMS

- A. Items listed in this Section are intended only as a guide, but do not relieve responsibility for verifying quantities and inclusion of all similar items. Thoroughly examine all Drawings for items of miscellaneous metal fabrications.
 - 1. Steel pipe bollards.

PART 3: EXECUTION

3.01 INSTALLATION GENERAL REQUIREMENTS

- A. Anchor to concrete and masonry with expansion or adhesive anchors where built-in anchorage is not provided; do not fasten to wood plugs set in masonry.
- B. Vertical members set into concrete or masonry: As shown.
- C. Bolts, screws, etc., for field connections: Same material, finish as base material.

3.02 FIELD SPLICES, WELDS

- A. Perform field welding in accordance with AWS D1.1.
- B. Welders shall be certified by AWS.
- C. Continuously weld field splices and grind smooth where exposed to view.
- D. Fill exposed splice joints with body filler and sand smooth.
- E. Touch-up joints, welds with specified primer.
- F. Touch-up damaged hot dipped galvanizing with Galvanizing Repair Compound per manufacturer's requirements.

END OF SECTION 05 50 00

SECTION 06 10 00
ROUGH CARPENTRY-WOOD FRAMED BUILDINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Structural dimension lumber framing.
- B Nonstructural dimension lumber framing.
- C Rough opening framing for louvers.
- D Sheathing.
- E Preservative treated wood materials.

1.02 SUBMITTALS

- A See Section 01 33 00 - Submittal Requirements for submittal procedures.
- B Product Data: Provide technical data on wood preservative materials.
- C Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

1.03 DELIVERY, STORAGE, AND HANDLING

- A General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A Provide preservative-treated lumber for work.
- B Sizes: Nominal sizes as indicated on drawings, S4S.
- C Moisture Content: S-dry or MC19.
- D Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm)):
 - 1. Species: Allowed under referenced grading rules.
 - 2. Grade: No. 2.
- E Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 (50 by 150 mm through 100 by 400 mm)):
 - 1. Machine stress-rated (MSR) as follows:
 - a. Fb-single; minimum extreme fiber stress in bending: 1350 psi (9,300 kPa).
 - b. E; minimum modulus of elasticity: 1,300,000 psi (8960 MPa).
 - 2. Species: Allowed under grading rules.
 - 3. Grade: No. 1 and Better.
- F Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: No. 2 or better.

2.03 STRUCTURAL COMPOSITE LUMBER

- A At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
 - 1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
 - 2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi (12,410 MPa), minimum.
 - 3. Headers Not Longer Than 48 inches (1220 mm): Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.

2.04 CONSTRUCTION PANELS-SHEATHING

- A Roof Sheathing: PS 2 type, rated Structural I Sheathing.
 - 1. Bond Classification: Exterior.
 - 2. Span Rating: 24/16.
 - 3. Performance Category: 3/4 PERF CAT.
- B Wall Sheathing: PS 2 type.
 - 1. Bond Classification: Exterior.
 - 2. Grade: Structural I Sheathing.
 - 3. Span Rating: 24/16 inch.
 - 4. Performance Category: 5/16 PERF CAT.
 - 5. Edge Profile: Square edge.

2.05 ACCESSORIES

- A Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
- C Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
- D Sill Gasket on Top of Foundation Wall: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.
- E Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.
 - 1. Thickness: 68 mils (0.068 inch) (1.7 mm).
 - 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
 - 3. Water Vapor Permeance: 0.035 perm (2 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.
- F Termite-Resistant Sill Flashing: Self-adhesive membrane; polyethylene film bonded to sealant.
 - 1. Thickness: 40 mils (0.040 inch) (1 mm).
 - 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
 - 3. Water Vapor Permeance: 0.035 perm (2 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.
- G Sill Flashing: As specified in Section 07 62 00.
- H Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

2.06 FACTORY WOOD TREATMENT

- A Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

PART 3 EXECUTION

3.01 PREPARATION

- A Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches (100 mm) and seal.
- B Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A Select material sizes to minimize waste.
- B Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C Install structural members full length without splices unless otherwise specifically detailed.
- D Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual.
- E Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. Nail panels to framing; staples are not permitted.
- B Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

3.06 TOLERANCES

- A Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.07 CLEANING

- A Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 00

SECTION 06 10 53
ROUGH CARPENTRY-WOOD BLOCKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Preservative treated wood materials.
- B Concealed wood blocking, nailers, and supports.
- C Miscellaneous wood nailers, furring, and grounds.

1.02 SUBMITTALS

- A See Section 01 33 00 - Submittal Requirements for submittal procedures.
- B Product Data: Provide technical data on fire retardant treated and preservative treated lumber.

1.03 DELIVERY, STORAGE, AND HANDLING

- A General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, Hem-Fir, or Southern Pine.
 - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A Provide preservative-treated lumber for work.
- B Sizes: Nominal sizes as indicated on drawings, S4S.
- C Moisture Content: S-dry or MC19.
- D Blocking for sizes 2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm):
 - 1. Species: Douglas Fir-Larch, Hem-Fir or Southern Pine.
 - 2. Grade: No.2.
- E Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No.2 or Standard Grade.

2.03 CONSTRUCTION PANELS-BLOCKING

- A Plywood blocking:
 - 1. Meet APA C-D exterior, thickness as shown on Drawings.
 - 2. Provide preservative-treated lumber for work.

2.04 ACCESSORIES

- A Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
- C Sill Sealer: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.
- D Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

2.05 FACTORY WOOD TREATMENT

- A Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A, using waterborne preservative to 0.10 lb/cu ft retention (to 1.6 kg/cu m retention).
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing (Note: treated blocking is not required when covered with roofing material, peel and stick type flashing and weather barrier).
 - d. Treat lumber in contact with masonry or concrete.
 - 2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention (to 4.0 kg/cu m retention).
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with roofing, flashing, or waterproofing (Note: treated blocking is not required when covered with roofing material, peel and stick type flashing or weather barrier).
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A Coordinate installation of rough carpentry members specified in other sections (obtain product data, sizes and anchorage requirements from other trades prior to installation) including, but not limited to:
 - 1. Roofing applications as specified in Divisions 7, 22 and 23.
 - 2. Windows, storefront and curtainwall in Division 8.
 - 3. Miscellaneous specialties in Division 10.
 - 4. Blocking for hardware in Section 08 71 00.
 - 5. Furniture fixtures and equipment items furnished by the Owner and noted on the drawings.

3.02 INSTALLATION - GENERAL

- A Select material sizes to minimize waste.
- B Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 ROOF-RELATED CARPENTRY

- A Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size: 48 by 96 inches (2440 by 4880 mm), installed horizontally at ceiling height.

3.06 CLEANING

- A Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 53

SECTION 07 31 13

ASPHALT SHINGLES

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes asphalt shingles for steep roofs.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Product data for each type of product specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.
 - 2. Samples for initial selection in the form of manufacturer's sample finishes showing the full range of colors and profiles available for each type of asphalt shingle indicated.

1.03 QUALITY ASSURANCE

- A. Fire-Test-Response Classification: Where products with a fire-test-response classification are specified, provide asphalt shingles identical to those tested according to ASTM E 108 or UL 790 and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify each bundle of asphalt shingles with appropriate markings indicating fire-test-response classification of applicable testing and inspecting agency.
- B. Wind-Resistance-Test Characteristics: Where wind-resistant asphalt shingles are indicated, provide products identical to those tested according to ASTM D 3161 or UL 997 and passed. Identify each bundle of asphalt shingles with appropriate markings of applicable testing and inspecting agency.
- C. Contractor to be certified by manufacturer to install shingles per warranty requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's unopened bundles or containers with labels intact.
- B. Handle and store materials at Project site to prevent water damage, staining, or other physical damage. Store roll goods on end. Comply with manufacturer's recommendations for job-site storage, handling, and protection.

1.05 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installing asphalt shingles only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements, and when substrate is completely dry.

1.06 WARRANTY

- A. Manufacturer's 40 year warranty on manufacturing defects: 100% Coverage for materials and labor for first 20 years and prorated thereafter.
- B. Warranted against algae discoloration for 10 years.

1.07 EXTRA MATERIALS

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

1. Furnish 1 square coverage of asphalt shingles, identical to those to be installed, in unbroken bundles.

PART 2: PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:

1. Products by Malarkey Roofing Products are specified.

2.02 ASPHALT SHINGLES

- A. Legacy Shingle Line. Contractor to verify match to existing Medical Center.

1. Color: Weathered Wood

2.03 ACCESSORIES

- A. Waterproof Underlayment (for use on entire substrate below shingles): “WinterGuard”; ASTM D 1970 sheet barrier of self-adhering rubberized asphalt membrane shingle underlayment having internal reinforcement, and “split” back plastic release film; provide material warranty with equal in duration to that of shingles being applied.

- B. Metal Drip Edge: Brake-formed sheet metal with at least a 2-inch roof deck flange and a 1-1/2-inch fascia flange with a 3/8-inch drip at lower edge. Furnish the following material in lengths of 8 or 10 feet.

1. Material: Aluminum sheets.
2. Color to match existing Medical Center, “Newport Taupe”.

- C. Metal Flashing: Job-cut to sizes and configurations required.

1. Material: 24 Gauge galvanized-steel sheets complying to ASTM A653/A; 653M; G90/Z275.

- D. Waterproof Underlayment: Minimum 40-mil-thick, self-adhering, self sealing polymer-modified, bituminous sheet membrane, with skid resistant granules. complying with ASTM D 1970, D2523, D903, and D4073 Provide primer when recommended by underlayment manufacturer.

- E. Asphalt Plastic Cement: Nonasbestos fibrated asphalt cement, complying with ASTM D 4586.

- F. Nonasbestos with Type I or II

- G. Nails: Aluminum or zinc coated steel, 10 to 12 gauge barbed shank, sharp-pointed, conventional roofing nails with a minimum 3/8-inch diameter head and of sufficient length to penetrate 3/4 inch into solid decking or at least 1/8 inch through plywood or OSB sheathing.

1. Where nails are in contact with flashing, prevent galvanic action by providing nails made from the same metal as that of the flashing.

- H. Plumbing vent flashing: Oakey Galvanized All-Flash or equal.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Examine substrate for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of asphalt shingles. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with noncorrosive roofing nails.
- B. Coordinate installation with flashings and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and are securely fastened against movement.

3.03 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations but not less than those recommended by ARMA's "Residential Asphalt Roofing Manual" or "The NRCA Steep Roofing Manual."
 - 1. Fasten asphalt shingles to roof sheathing with nails.
 - 2. Fasten asphalt shingles to roof sheathing with either roofing staples, applied pneumatically, or nails.
- B. Waterproof Underlayment: Apply waterproof underlayment at eaves. Cover deck from eaves to at least **24 inches** inside exterior wall line.
 - 1. In addition to eaves, apply waterproof underlayment in place of felt underlayment at valleys.
- C. Felt Underlayment: Apply 1 layer of felt underlayment horizontally over entire surface to receive asphalt shingles, lapping succeeding courses a minimum of **2 inches**, end laps a minimum of **4 inches**, and hips and valleys a minimum of **6 inches**. Fasten felt with sufficient number of roofing nails or noncorrosive staples to hold underlayment in place until asphalt shingle installation.
 - 1. Apply an additional layer of felt underlayment on roof decks with a slope of **2 to 4 inches per foot**.
 - 2. Omit felt underlayment at areas of waterproof underlayment. Lap felt underlayment over waterproof underlayment as recommended by manufacturer but not less than **2 inches**.
- D. Flashing: Install metal flashing and trim as indicated and according to details and recommendations of the "Asphalt Roofing" section of "The NRCA Steep Roofing Manual" and ARMA's "Residential Asphalt Roofing Manual."
- E. Install asphalt shingles, beginning at roof's lower edge, with a starter strip of roll roofing. Fasten asphalt shingles in the desired weather exposure pattern; use number of fasteners per shingle as recommended by manufacturer. Use vertical and horizontal chalk lines to ensure straight coursing.
 - 1. Cut and fit asphalt shingles at valleys, ridges, and edges to provide maximum weather protection. Provide same weather exposure at ridges as specified for roof. Lap asphalt shingles at ridges to shed water away from direction of prevailing wind.
 - 2. Use fasteners at ridges of sufficient length to penetrate sheathing as specified.

3.04 PROTECTION

- A. Any roof areas that are not completed by the end of the workday are to be protected from moisture and contaminants.

3.05 ADJUSTING

- A. Replace any damaged materials installed under this Section with new materials that meet specified requirements.

END OF SECTION 07 31 13

SECTION 07 46 00

FIBER-CEMENT SIDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes fiber-cement siding and trim.
- B. Rainscreen System Requirements: If required by fiber-cement siding manufacturer for full manufacturer's warranty of product, provide furring strips for rainscreen system as required by fiber-cement siding manufacturer's written installation instructions.
- C. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
 - 2. Section 072500 "Weather Barriers" for weather-resistive barriers.
 - 3. Section 074619 "Steel Siding" for horizontal steel lap siding, vented soffit, gutters, and downspouts.
 - 4. Section 079200 "Joint Sealants" for joint sealants.

1.03 COORDINATION

- A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include installation methods, including nailing patterns.
- B. Samples for Initial Selection: For fiber-cement siding and trim including related accessories.
- C. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch-long-by-actual-width Sample of siding.
 - 2. 12-inch-long-by-actual-width Sample of soffit.
 - 3. 12-inch-long-by-actual-width Samples of trim and accessories.

1.06 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fiber-cement siding and trim.

- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

1.07 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of fiber-cement siding and trim including related accessories, in a quantity equal to 2 percent of amount installed.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.
- B. Store materials on elevated platforms, under cover, and in a dry location.

PART 2 - PRODUCTS

2.01 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide Allura of Plycem; Fiber Cement Siding Products, or equal products by one of the following:
 - a. CertainTeed Corporation.
 - b. GAF Materials Corporation.
 - c. MaxiTile, Inc.
 - d. Nichiha Fiber Cement.
 - e. Norandex Building Materials Distribution, Inc.
- B. Fiber Cement Siding specification is based on Allura of Plycem; Fiber Cement Siding Products.
- C. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.
- D. Fiber Cement Board Panels - General: Allura Fiber Cement Board Panels consist of cement, recycled content and cellulose fiber formed under high pressure into boards with integral surface texture; complying with ASTM C 1186 Type A Grade II; machined edges; for nail attachment.
 - 1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 5, maximum; when tested in accordance with ASTM E 84 (Class I/A).
 - 2. Flammability: Noncombustible, when tested in accordance with ASTM E 136.
 - 3. Flexural Strength: At least 1450 psi when in equilibrium condition, and at least 1015 psi when in wet condition, tested in accordance with ASTM C 1185.
 - 4. Coefficient of Thermal Expansion: Less than 1×10^{-5} /inch/inch/degree F, when tested in accordance with ASTM E 228.
 - 5. Freeze Thaw Resistance: At least 80 percent flexural strength retained, when tested in accordance with ASTM C 1185.

6. UV Resistance: No cracking, checking, or erosion, when tested for 2000 hours in accordance with ASTM G 26.
7. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C 1185.

E. Basis of Design: Allura Vertical Siding.

1. All siding and trim to match existing Medical Center trim. Contractor to verify match of siding and color prior to order.
 - a. Prefinished Colormax Certaineed Weatherboard Fiber Cement Soffit. 12” vented soffit w/ 24” solid soffit. Color to match existing “Heritage Clay” on Medical Center clinic.
 - b. Prefinished Colormax Certaineed Weatherboard Vertical Siding, smooth vertical panel with battens at 12” o.c. Split Certaineed 5 1/2” 4/4 smooth trim boards into three pieces to form 1 7/8” battens. Color for vertical siding and battens to match “Hardieplank,” “Country Land Red JH90-20.”

2.02 ACCESSORIES

A. Trim: Allura Trim/Fascia Board

1. Size:
 - a. Thickness 7/16 inch plus or minus (1 mm).
 - b. Width:
 - 1) 3-1/2 inch - Trim.
 - 2) 10 inch - Fascia.
 - c. Length: 12 feet plus or minus 1/8 inch.
 - d. Color: 3 1/2 inch trim and 10 inch fascia to match “Newport Taupe” on Medical Center.
2. Provide the following trim:
 - a. Running trim as indicated on Drawings.
 - b. Outside corners, overlapping siding.
3. Sealant/Primer: Manufacturers primary Sealant/Primer.

B. Sealant: Paintable, 100 percent acrylic latex caulk complying with ASTM C 920.

C. Field finish paint: 100% acrylic latex as specified in Section 09 90 00.

D. Flashing: Provide flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

E. Fasteners: Provide fasteners and fastening patterns as required by manufacturer’s ICC Research/Evaluation Report; hot-dipped galvanized or stainless steel.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and trim and related accessories.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and as indicated on Drawings.
 - 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3. Use trim details indicated on drawings.
 - 4. Touch up all field cut edges before installing.
 - 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- C. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- F. Furred Installation: Leave space at top and bottom open; top may be behind soffit; at bottom install insect screen overopening by wrapping a strip of screen over bottom ends of vertical furring strips.
- G. Install sheet metal flashing above louver casings and horizontal trim in field of siding.
- H. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- I. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.
 - 1. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.

3.04 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

3.05 FACTORY FINISH TOUCH UP

- A. Factory Finish Touch Up: Match touch up color to siding color through use of manufacturer's branded touch-up kits.
 - 1. Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
 - 2. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit.
 - 3. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.

4. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding.

END OF SECTION 07 46 00

SECTION 07 62 00

SHEET METAL COPING AND FLASHING

PART 1: GENERAL

1.01 SUMMARY

A. Section includes:

1. Sheet metal coping, flashing and counterflashing shown on Drawings.
2. Sheet metal gutters and downspouts.
3. Sheet metal scuppers and downspouts.
4. Pre-fabricated coping or approved ANSI/SPRI ES-1 contractor fabricated coping.
5. Prior to installation of finished materials, all flexible flashings shall be observed by the Architect. The Architect shall be given a minimum of 72 hours notice prior to the desired observation time. Any finish materials (i.e., brick, insulation, metal, etc.) installed without observation by the Architect shall be removed and replaced at the Contractor's expense.

1.02 QUALITY ASSURANCE

- A. Referenced Standards: Recommended practices as set forth by the Sheet Metal and Air Conditioning Contractors Association, Inc. (SMACNA) in the "Architectural Sheet Metal Manual" are by reference made a part of this work.
- B. Perform Work in a manner that will maintain warranties on associated work specified in other sections.
- C. See Civil for all downspout connection coordination.
- D. Refer to Electrical for Heat Tape.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
1. Shop Drawings: Indicating joint treatment, fastening methods, thickness and finish of materials.
 2. Samples: Actual metal samples of each color indicated.
 3. Submit documentation that Contractor manufactured coping (if applicable) meets ANSI/SPRI ES-1.

PART 2: PRODUCTS

2.01 GENERAL

- A. Provide all accessories, other items essential to completeness of installation, though not indicated, specified. All such items, unless otherwise indicated, specified: Of same kind of material as item to which applied. Nails, screws, bolts: Of types best suited for purpose intended, of composition that is compatible with metal to which it will contact.
- B. Type, locations of various kinds, gauges, thickness, finish of Sheet Metal to be used is specified hereinafter, however, where sheet metal is indicated and kind, type of metal is not definitely specified, noted, provide 24 ga. prefinished galvanized steel.

2.02 MATERIALS

A. Sheet Metal (Exposed)

1. Materials manufactured by Firestone Building Products – UNA-CLAD are specified. Other manufacturers meeting specified requirements are acceptable, subject to approval of color and warranty.
2. Minimum 24 ga. G-90 galvanized steel prefinished with Kynar 500 or Hylar 5000 fluorocarbon coating.
3. Colors: Custom color to exterior trim.
4. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 year warranty period.
 - a. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - 1) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - 2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - 3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
5. Provide factory applied protective film. Do not remove until after fabrication and installation is complete.

B. Sheet Metal (Concealed): Minimum 22 ga. G-90 hot dipped galvanized steel.

C. Flexible Flashings/Underlayment: WR Grace "Ice and Watershield" or equal.

1. 40 mil rubberized asphalt adhesive backed by high density cross laminated polyethylene.
 - a. Tensile Strength: 250 psi per ASTM D412 (Die C Modified).
 - b. Elongation: 250% per ASTM D412 (Die C Modified).

2.03 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal with factory-applied coating.
 - b. Blind Fasteners: Stainless-steel rivets suitable for metal being fastened.
2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

2. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by the manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.04 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Gutters and downspouts.
- B. Hanging Gutters: Fabricate to "K" profile, .29" thickness, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters
 1. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.
 2. Materials: Same as exposed sheet metal.
 3. Color to match "Newport Taupe" on Medical Center.
- C. Downspouts: Fabricate downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors. Size as recommended by SMACNA or as detailed.
 1. Materials: Same as gutters.
 2. Color to match "Newport Taupe" on Medical Center.

2.05 FABRICATION

- A. Accurately form work with brakes straight, true and sharp. Make plain surfaces free from waves and buckles. Match profiles exactly at connections. Bead or return exposed edges for strength and appearance. Provide ribs, cleats and reinforcement necessary to make the sections rigid and substantial. Allow for expansion and contraction.
- B. Overlap seams in the direction of flow. Finished width of lock seams and soldered lap seams: Not less than 1". Finished width of unsoldered lap seams: Not less than 3".
- C. Locate joints of sheet metal work exposed to view with respect to column centers, mullions, control joints or other architectural features as indicated on the Drawings or as directed by the Architect. Use concealed cover plates. Where appearance is not a factor, sheet metal work may be fabricated in 8 or 10-foot lengths.
- D. Generally, joints shall be single locked and soldered or double locked and sealed. Field joints shall be designed to permit expansion. Shop form corner pieces. Internal corners shall be lapped, riveted and sealed. External corners shall be lapped, riveted and sealed where exposed to view and locked and soldered where appearance is not a factor. Locate field joints not less than 12" nor more than 3 feet from actual corner.
- E. Fabricate sheet metal to be installed using concealed clips or other concealed fasteners where possible. Form joints and hem edges to conceal uncoated edges of metal. Handle prefinished sheet metal with care to prevent scratching or damaging surface.

PART 3: EXECUTION

3.01 WORKMANSHIP

- A. Examine surfaces to be covered by sheet metal. Report any improper defective surfaces to Contractor, Architect in writing. Beginning of Sheet Metal Work over surfaces: Presumed as acceptance of surfaces as satisfactory by Sheet Metal Sub-contractor.
- B. Verify field dimensions prior to fabrication.
- C. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
- E. Ensure that all work is precisely done, true to line, and free from over bending, burning, deforming, stretching, distortion, waves and buckles.
- F. Seal under and around all fasteners which penetrate elastomeric roofing or flashing.
- G. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
- H. Downspouts: Join sections with 1-1/2 telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
 - 2. Provide elbows at base of downspout to connect downspouts to underground drainage system indicated.

3.02 REPAIR

- A. Repair or replace all damaged or defective work.

3.03 CLEANING

- A. Clean exposed sheet metal of roofing materials, mortar, hand marks, other foreign materials.
- B. Remove protective covering from sheet metal.
- C. Touch up minor scratches in finish with matching paint, compatible with specified finish.

END OF SECTION 07 62 00

SECTION 07 92 00

SEALANTS AND CAULKING

PART 1: GENERAL

1.01 SUMMARY

A. Exterior colored sealants:

1. Joints in masonry.
2. Joints around hollow metal.
3. Miscellaneous joints where “sealant” or “caulk/caulking” is indicated on drawings.
4. Joints around mechanical, electrical and architectural penetrations of exterior masonry skin.
5. Installation of sealant on masonry quality control panel for color match and adhesion verification by means of an adhesion test.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

1. Product Data: Manufacturer’s data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods including joint design, surface preparation, and application instructions.
 - d. Submit manufacturer’s test reports indicating test results of adhesion and/or compatibility testing of samples of substrates which either come in contact with or are in close proximity to sealants.
2. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer’s full range of available colors or samples of custom color matches for Architect’s acceptance.
3. Samples of Warranty.
4. Manufactures approval of installer.

1.03 QUALITY ASSURANCE

A. Applicator Qualifications

1. Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.
2. Designate one individual as project foreman who shall be on site at all times during installation.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in manufacturers unopened original packaging. Inspect for damage.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1. Store materials in a clean, dry area indoors in accordance with manufacturer’s instructions.
2. Store sealants within temperature range in accordance with manufacturer’s instructions.
3. Keep containers sealed until ready for use.

4. Do not use materials after manufacturer's use-before date.

1.05 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 1. Do not apply sealants to surfaces that are wet, damp, or contain frost.
 2. Do not apply sealants when air or surface temperature is below 40 degrees F.
 3. Use caution when applying sealants when air or surface temperature is above 120 degrees F.

1.06 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty for Exterior Sealants: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2: PRODUCTS

2.01 EXTERIOR SEALANTS

- A. Silicone Sealant: Single Component, Nonsag, Neutral-Curing Silicone joint sealant conforming to ASTM C 920, Type S, Grade NS, Class 100/50. Maximum VOC: 98 g/L.
 1. Manufacturers/product:
 - a. Dow Corning, 790.
 - b. GE/Momentive Performance Materials, SilPruf LM SCS 2700.
 - c. Pecora, 890 or 890 FTS
 - d. Temco Spectrem 1 or Spectrem 4
 2. Colors: Custom colors to match material or finish sealant occurs in.
- B. Hybrid Polymer Sealant: Low modulus, non-sag, elastomeric, hybrid sealant, conforming to ASTM C 920, Type S, Grade NS, Class 50. Maximum VOC: 13.6 g/L.
 1. Manufacturers/Products:
 - a. BASF MasterSeal NP 150/NP 100.
 - b. SIKA, Sikaflex 15LM.
 - c. TREMCO, Dymonic FC
 2. Colors: Custom colors to match material or finish sealant occurs in.

2.02 ACCESSORIES

- A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Inspect joints for compliance with requirements for joint configuration, installation tolerance, and other conditions affecting joint sealant performance. Correct unsatisfactory conditions before proceeding.
- B. Do not install sealants during use of temporary heaters or until vapors from temporary heaters are flushed from building. Do not install sealant when painting operations are in progress.

3.02 PREPARATION

- A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.
- B. Clean out joints immediately before installing joint sealants (within 1 to 2 hours of sealant application), in accordance with joint sealant manufacturer's recommendations and the following requirements:
 - 1. Remove from joint substrates foreign material which could interfere with adhesion of joint sealant, including paints other than permanent protective coating tested and approved for sealant adhesion and compatibility by sealant manufacturer, oil, grease, waterproofing, water repellants, water dirt, and frost.
 - 2. Clean porous joint substrates using approved methods such as brushing, grinding, blast cleaning, mechanical abrading, and acid washing as appropriate, or a combination of these methods, to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean metal and other nonporous substrates by using chemical cleaners or other means that neither are harmful to substrates nor leave residues capable of interfering with adhesion of joint sealants.
- C. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to area of joint sealer bond; do not allow spillage or migration onto adjoining surfaces. Allow primer to dry before applying sealant.
- D. Masking Tape: Use masking tape where required to prevent contamination of adjacent surfaces; remove tape immediately after tooling and before sealants begin to cure without disturbing seal.

3.03 SEALANT INSTALLATION

- A. Comply with joint sealant manufacturer's printed installation instructions.
- B. Installation of Sealant Backings:
 - 1. Install joint filler to provide support of sealant during application and at position required to produce the cross-sectional shape and depth of installed sealant relative to joint width that allows optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove fillers which have become wet prior to sealant application and replace with dry materials.
 - 2. Install bond breaker tape when joint depth is too shallow to allow backer rod.
- C. Installation of Sealant:
 - 1. Install sealants by proven techniques that result in direct contact with and full wetting of joint substrates by joint sealant, completely filling recesses provided and providing uniform cross-sectional shapes and depths relative to joint widths. Sealant depth to be ½ the width of the joint and 1/3 the width at the center, creating an hourglass shape. Maximum depth of caulk at center to be 3/8". Air pockets or voids are not acceptable.
 - 2. Immediately after sealant application and prior to the skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or which are not approved by sealant manufacturer.

3.04 PROTECTION AND CLEANING

- A. Protect joint sealers, during and after curing, from contamination or damage. Cut out and remove damaged or deteriorated sealers and replace with new materials.
- B. Clean excess sealants or sealant smears adjacent to joints as work progresses.

3.05 FIELD QUALITY CONTROL

- A. Perform adhesion tests on exterior sealant in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.
 - 1. Perform 5 tests for first 1,000 linear feet of applied exterior sealant and 1 test for each 1,000 feet of seal thereafter. If there is less than 1,000 feet, perform 1 test per floor per building elevation minimum.
 - 2. For sealant applied between dissimilar materials, test both sides of joint.
- B. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
- C. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

END OF SECTION 07 92 00

SECTION 08 91 00

LOUVERS

PART 1: GENERAL

1.01 SUMMARY

A. Section includes:

1. Pre-finished aluminum exterior wall louvers.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

1. Product Data: Submit product data sheet for specified products.
 - a. Performance Certificates: Submit performance certification, if not include in product data.
2. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, flexible flashings, accessories, finish colors, patterns and textures.
 - a. Include information necessary for fabrication and installation of louvers. Indicate materials, sizes, thickness, fastening and profiles.
3. Quality Assurance Submittals: Submit the following:
 - a. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 1) Submit certified test results from an approved testing laboratory showing that the louvers proposed meet the criteria specified herein.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Package, handle, deliver and store at the job site in a manner which will avoid damage or deformation. Damaged louvers including nicks, scratches and blemishes will be rejected.

1.04 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings.

PART 2: PRODUCTS

2.01 LOUVERS

A. Manufacturer: Products by Industrial Louvers, Inc., www.industriallouvers.com, 763-972-2981 are specified. Other manufacturers who conform with the specification are acceptable.

2.02 WALL LOUVERS

A. Model: 458XP

1. Frame:
 - a. Frame Depth: 4 inches.
 - b. Material: Extruded aluminum, 6063-T6 or 6063-T5
 - c. Wall Thickness: 0.081 inch, nominal
2. Blades:
 - a. Style: Drainable
 - b. Material: Extruded aluminum, 6063-T6
 - c. Wall Thickness: 0.081 inch, nominal
 - d. Angle: 35/45 degrees
 - e. Centers: 3.875 inches, nominal
3. Performance Data:
 - a. Performance Ratings: Product must be licensed to bear the AMCA Certified Ratings Seal for Water and Air Performance.
 - 1) Based on testing 48 inches by 48 inches size unit in accordance with AMCA 500-L.
 - b. Free Area: 53.4% (8.54 sq.ft)
 - c. Water Penetration: Maximum of .01 ounces at an air flow of 1062.8 FPM
 - d. Static Pressure Loss: Not more than .15 inch of water gauge at an air flow of 854 FPM free area velocity.
4. Louver Accessories:
 - a. Exterior Aluminum Sill: Provide sill flashing of same material and finish as louvers where indicated on the drawings.
 - b. Louver Screens: Provide framed removable, re-wire-able screens for exterior louvers.
 - 1) Bird Screen:
 - a) Aluminum, 1/2 inch by 0.063 inch expanded, flattened.
 - c. Blank Off Panels:
 - 1) Non-Insulated Blank Off Panels factory installed with removable screws and foam tape gaskets:
 - a) 0.040 inch aluminum sheet.

2.03 MATERIALS

- A. Aluminum Sheet: ASTM B209 Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer to provide required finish.
- B. Aluminum Extrusions: ASTM B221, Alloy 6063.
- C. Fastenings: Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

2.04 FABRICATION

A. Fabrication Requirements:

1. Performance: Fabricate as required for optimum performance with respect to water penetration, strength, durability and uniform appearance.
2. Size:
 - a. Fabricate louvers in masonry walls to outside dimensions indicated, with allowance of 3/8" on each side for sealant joints.
 - b. Verify sizes with final HVAC shop drawings, including detail dimensions of ductwork, dampers or other fittings abutting louvers.
3. Field Measurements: Verify size, location and placement of louver units prior to fabrication.
4. Shop Assembly:
 - a. Fabricate to minimize field adjustments, splicing, mechanical joints and field assembly of units.
 - b. Preassemble units in shop to greatest possible and disassemble as necessary for shipping and handling.
 - c. Clearly mark units for reassembly and coordinated installation.
5. Accessories: Include supports, anchorages and accessories required for complete assembly.
6. Vertical Mullions: Provide vertical mullions of type and spacing indicated but not further apart than recommended by the manufacturer.
7. Horizontal Mullions: Provide horizontal mullions at horizontal joints between louver units except where continuous vertical assemblies are indicated.
8. Connections: Join frame and blade members to one another by welding, except where field bolted connections between frame members are made necessary by size of louvers.
9. Spacing: Maintain equal blade spacing to produce uniform appearance.

2.05 FACTORY FINISHES

- A. Finish/Colors: "Hardieplank", "Country Land Red JH90-20".

PART 3: EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Louver Installation:

1. Louvers shall be installed in accordance with manufacturers approved shop drawings and as shown. Provide all necessary fastenings and anchors required to complete installation.
2. Form tight joints within work of this Section. Fit exposed connections accurately.
3. Protect metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces, which shall be in contact with concrete, masonry or dissimilar metals.

3.04 PROTECTION AND CLEANING

- A. Protect louvers and finish from damage by other trades.
- B. Repair damaged louvers or replace.

END OF SECTION 08 91 00

SECTION 09 91 00

PAINTING

PART 1: GENERAL

1.01 SUMMARY

A. Section includes:

1. Field finish all materials scheduled and/or specified for paint, trim, stain or seal.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00:

1. Provide three (3) copies of a schedule detailing each substrate in the same order as the schedules used in Part 2 of this section. Include the following:
 - a. The specific products to be used for each coat.
 - b. Documentation that the manufacturer has reviewed and approved each painting system.
 - c. Data pages for all products listed, highlight the following:
 - 1) Type of resin.
 - 2) Dry Film Thickness.
 - 3) Volume Solids.
 - 4) Units of Sheen.
 - 5) VOC content and chemical components.
 - 6) Other performance or descriptive data required by Part 2 of this section.
 - 7) If this information is not on the data page provide the information in a letter of certification from the manufacturer. Attach the letter to the appropriate data page.
2. Submit three (3) drawdowns of each product and color combination. Drawdowns shall be applied using a 4 mil WFT drawdown bar on Leneta form WD plain white coated cards size 3-7/8" x 6".
 - a. Label each card with the following:
 - 1) Job name.
 - 2) Date.
 - 3) Product name.
 - 4) Product number.
 - 5) Color number as stated in the material finish/color schedule.
 - 6) Name, address, and phone number of the supplying facility.
 - 7) Surface material product is to be applied onto.
3. Do not deliver material to site until having received written approval of submitted information and samples.
4. Complete sample area on project as selected by Architect on each type surface and with each type of paint system specified. Do not proceed further with application until receiving acceptance of each sample area by Architect. Accepted areas will serve as standard of quality for entire project.

1.03 EXAMINATION OF DOCUMENTS

A. Examine the specifications for the work of other trade contractors and to become familiar with their work. All surfaces that are left unfinished by the requirements of other specifications to be finished by this section.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use, in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg. F.
 - 1. Maintain containers in clean condition, free for foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.05 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
- C. Do not apply coatings during cold, rainy or frosty weather.
- D. Do not apply to surfaces, which are exposed to hot sun.

1.06 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in “MPI Approved Products List.”
 - 2. Preparation and Workmanship: Comply with requirements in “MPI Architectural Painting Specification Manual” for products and paint systems indicated.

PART 2: PRODUCTS

2.01 PAINTING SYSTEMS

- A. Painting systems for normal applications are specified using the products of Sherwin-Williams Co. (S-W); PPG Paints: (PPG) and Glidden Professional: (GP); Benjamin Moore & Co.: (BM) to establish standards of quality, except as noted.
 - 1. Other manufacturers can submit for approval through the pre-bid process defined in Section 01 25 00 Substitutions and Product options.
 - a. For approval, submit data sheets for each paint type with volume solids and VOC’s highlighted to indicate they meet or exceed products specified in Part 2.
- B. Painting systems for specialty applications are specified using the products of Aquarius Coatings, Carboline, Seal-Krete, Rosco, Sika Corporation and manufacturers listed in 2.01A.
- C. Use the materials of the same manufacturer for each system.
- D. For color selection see Material Finish/Color Schedule, on Architectural Drawings.

2.02 PRIMERS (EXTERIOR)

A. 100% Acrylic Exterior Wood Primer:

1. Minimum Volume Solids: 34%.
2. Maximum VOC: 150 g/L
 - a. S-W Exterior Latex Wood Primer B80W41.
 - b. GP Hydrosealer Exterior Primer/Sealer 6001-1200.
 - c. PPG Speedhide Exterior Acrylic Wood Primer, 6-609.
 - d. BM Fresh Start High hiding All Purpose Primer N046.

B. Alkyd Exterior Wood Primer:

1. Minimum Volume Solids: 55%.
2. Maximum VOC: 350 g/L
 - a. S-W Exterior Oil Based Primer Y24W8020.
 - b. GP Stain Stomper Exterior Solvent Based Primer Sealer 2110-1200N.
 - c. PPG Seal Grip Int/Ext Alkyd Primer 17-941 NF.
 - d. BM Fresh Start Exterior Wood Primer 094.

C. High Performance Alkyd Primer:

1. Minimum Volume Solids: 48%.
2. Maximum VOC: 425 g/L
 - a. S-W Kem Kromik Universal Metal Primer
 - b. PPG Speedhide Zinc Chromate Metal Primer, 6-204.

2.03 EXTERIOR FINISH PAINTS

A. 100% Acrylic Exterior Satin Coating:

1. Minimum Volume Solids: 29%.
2. Maximum VOC: 150 g/L
3. Sheen: 10-20 units at 60 degrees.
 - a. S-W A-100 Exterior Latex Satin A82 series.
 - b. GP Ultra-Hide 150 Exterior Satin Paint 2412V series.
 - c. PPG Speedhide Exterior Satin 6-2045XI.
 - d. BM Ultra Spec Exterior Satin N448.

2.04 EXTRA STOCK

- A. Provide left over paint with Owner for touch-up purposes. At completion of project, provide one complete set of drawdowns in each maintenance manual with a schedule noting the locations each paint color was used. Refer to Section 01 78 39.

PART 3: EXECUTION

3.01 PREPARATION OF SURFACES

A. General

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
2. Do not start work until preparation specified in surface Section is completed.
3. Ensure surfaces are dry and adequately protected from dampness.
4. Thoroughly clean surfaces free of loose, rough and foreign substances which will affect adhesion or appearance of applied coats.
5. Remove mildew and neutralize surface.
6. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting.
 - a. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - b. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
7. Complete repainting or refinishing will be required if coats are applied over improperly prepared surfaces.

B. Wood

1. Hand sandpaper to smooth surface. Sand direction of grain, taking care not to mar character of details and sharp edges. Remove sanding dust.
2. After first coat is dry, thoroughly coat, with shellac (suitably reduced with alcohol for flowing consistency) or known sealer, knots, pitch pockets and resinous sapwood areas.
3. After first coat is dry, fill nail holes, cracks and defects with colored putty tinted to match stain or paint.
4. Previously painted surfaces must be free of dirt, mildew, loose paint, etc. Excessive chalking or dirt must be removed by washing with water. Hard glossy surfaces are to be lightly sanded or dulled with deglosser/cleaner. Openings permitting entrance of water should be caulked prior to painting. Surfaces in poor condition must be prepared for repainting by removing loose paint and blisters by scraping, sanding or burning. Paint in these areas is to be removed at least 12 inches beyond the failing area. Prime before applying finish coats.

3.02 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Wood: 15 percent

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- E. Conditions
 - 1. Do no work when surface, coating product, air temperature, humidity or dewpoint does not meet requirements of PROJECT CONDITIONS in Part 1 of this specification.
 - 2. Do work under adequate illumination and dust-free conditions.

3.03 APPLICATION

- A. Methods: Paint may be applied by brush, roller or spray methods except where particular method will produce unsatisfactory results. Where spray method is used on concrete block, follow with roller to work paint into voids.
- B. Materials: Do not open containers until required for use. Stir materials thoroughly and keep at uniform consistency during application.
- C. Coats
 - 1. Number specified is minimum. Provide sufficient number of coats to provide even, consistent, opaque coverage of substrate.
 - 2. Touch up suction spots between coats.
 - 3. Refinish surfaces affected by refitting work.
 - 4. Tint prime and under coats of paint approximately 1/2 to 3/4 depth of final color.
 - 5. Touch up suction and "hot" spots in plaster and concrete after application of first coat and before second coat.
 - 6. Do not apply next coat until previous is thoroughly dry.
 - 7. Provide final coat which is solid and even in color; free from runs, laps, sags, brush marks, air bubbles and excessive roller stipple and worked into crevices, joint and similar areas.
 - 8. Do not paint sealant / sealant joints.

3.04 SCHEDULE OF EXTERIOR WORK

- A. Wood – Painted, Wood, Plywood.
 - 1. 1st Coat (New Surfaces): 100% Acrylic Exterior Wood Primer
 - a. Minimum DFT: 1.4 mils
 - 2. 1st Coat (Existing Surfaces): Existing Painted Surface Primer.
 - a. Minimum DFT: 0.9 mils.
 - 3. 2nd and 3rd Coat: 100% Acrylic Exterior Satin Coating
 - a. Minimum DFT: 1.3 mils per coat

B. Wood – Painted Hardboard.

1. 1st Coat (New Surfaces): Alkyd Exterior Wood Primer
 - a. Minimum DFT: 1.8 mils
2. 1st Coat (Existing Surfaces): Existing Painted Surface Primer.
 - a. Minimum DFT: 0.9 mils.
3. 2nd and 3rd Coat: 100% Acrylic Exterior Satin Coating
 - a. Minimum DFT: 1.3 mils per coat

3.05 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 FIELD QUALITY CONTROL

- A. Testing and Painting Application: Owner reserves the right to test DFT of painted surfaces.
 1. If testing discovers that DFT of installed paint does not meet specification, the Contractor will pay for initial and final testing and recoat surfaces until testing agency confirms specification is met.

END OF SECTION 09 91 00

SECTION 10 22 23

WIRE MESH PARTITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: 8'-0" high galvanized chain link, partitions and hinged doors.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00:
1. Shop Drawings: Submit in accordance with Section 01 33 00 prior to fabrication, construction, finishes, accessories, installation methods.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver product in manufacturer's original unopened, packages with labels legible, intact.
- B. Identify, manufacturer, brand name, model, size, finish, location of installation.
- C. Store folding partitions, accessories in unopened packages in protected dry area to prevent damage from environmental and construction operations.
- D. Handle partitions with care to prevent damage.

PART 2 PRODUCTS

2.01 WIRE MESH PARTITIONS

- A. Partition: Acorn Wire and Iron Works, Inc. Equivalent products by Miller Wire Works and Woven Wire Works.
- B. Partition type: 130AL.
- C. Construction:
1. All wire type constructed of 10 gauge galvanized steel wire woven in 1 1/2" diamond mesh, securely clinched to frames.
 2. Vertical frames to be 1 1/4" x 5/8" cold rolled 'C' section channels with 1/4" bolt holes 12" o.c.
 3. Horizontal frames 1" x 1/2" cold rolled channels.
 4. All joints mortised and tenoned.
 5. Center reinforcing bar 1" x 1/2" cold rolled channel tenoned to side frames. All wires passed through center bar.
 6. Flat bar posts to be (5/16" x 1-3/4") (5/16" x 2 1/2") (5/16" x 3") (as detailed) with 1/4" bolt holes to match partition.
 7. Top capping bar 2 1/4" x 1" cold rolled channel with 1/4" 'U' bolts 2'-4" o.c. May be anchored to walls and/or ceilings.

8. Corner posts 1 ¼" x 1 ¼" angle with ¼" bolt holes to match partition.
9. Floor sockets (aluminum) 2 ½" high with set screw adjustment.
10. Hinged Doors (2): Hinged door frame to be 1 ¼" x ½" channel with 1 ¼" x 1/8" flat bar cover all around. Doors to be 4'-0" x 7'-0" and have 1 ½ pairs butt hinges riveted to both door and hinge bar. Clasp and latch for pad lock. Pad lock to be provided by Owner.
11. All bolts, hardware, and accessories for complete installation to be included.
12. Field bracing furnished by erector frame around existing structure.
13. Factory finish, electrostatic sprayed blade enamel.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify for correct dimensions, or lack of squareness and plumb which would affect quality and execution of work.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install partition to tolerance of ¼ inch in 10 ft. non-accumulating.
- B. Fasten to supports with suitable fasteners.

END OF SECTION 10 22 23

SECTION 23 31 13

DUCTWORK

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

1.02 PERFORMANCE REQUIREMENTS

A. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated. Closure systems shall comply with their applicable UL 181 label and listing.

1. Static-Pressure Classes:

- a. Generator Exhaust Ducts: 1-inch wg.

1.03 SUBMITTALS

A. Product Data: For each type of the following products:

1. Sealants and gaskets.

B. Shop Drawings

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Equipment installation based on equipment being used on Project.
10. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
11. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Welding certificates.

D. Field quality-control reports.

1.04 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 - 2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2: PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for surfaces exposed to View only when shown to be painted on architectural plans: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Closure systems shall comply with their applicable UL 181 label and listing.

C. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

D. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.04 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3: EXECUTION

3.01 DUCT APPLICATIONS

- A. Fabricate ducts with galvanized sheet steel.
- B. Intermediate Reinforcement:
 - 1. Galvanized-Steel Ducts: Galvanized steel.
- C. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."

3.02 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines Advanced Cleanliness Level."

3.03 SEAM, JOINT AND CONNECTIONS SEALING

- A. All longitudinal and transverse joints, seams, and connections in metallic and non-metallic ducts shall be constructed as specified in SMACNA *HVAC Duct Construction Standards – Metal and Flexible* and NAIMA *Fibrous Glass Duct Construction Standards*. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants, or tapes. Closure systems used to seal ductwork listed and labeled in accordance with UL 181A shall be marked “181A-P” for pressure-sensitive tape, “181A-M” for mastic or “181A-H” for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181B-FX” for pressure-sensitive tape or “181B-M” for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked “181B-C”. Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer’s installation instructions. Pressure-sensitive tape shall not be used as primary sealant on ducts, unless it has been certified to comply with UL 181A or UL 181B by a nationally recognized testing laboratory and the tape is used in accordance with certification. Unlisted duct tape is not permitted as a sealant on any duct.
1. Exception: Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column pressure classification shall not require additional closure systems.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- G. Hangers shall not be attached to metal roof deck.

3.05 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for outlet and inlet connections.

END OF SECTION 23 31 13

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes:

1. Duct-mounted access doors.
2. Flexible connectors.
3. Duct accessory hardware.

1.02 SUBMITTALS

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

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.

C. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2: PRODUCTS

2.01 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 DUCT-MOUNTED ACCESS DOORS

- A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
 - d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

2.03 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to 2 strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd..
 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 3. Service Temperature: Minus 50 to plus 250 deg F.
- E. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel.
- C. Connect ducts to duct silencers rigidly.
- D. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 1. As indicated.
- E. Install access doors with swing against duct static pressure.
- F. Access Door Sizes:
 1. One-Hand or Inspection Access: 8 by 5 inches.
 2. Two-Hand Access: 12 by 6 inches.
 3. Head and Hand Access: 18 by 10 inches.
 4. Head and Shoulders Access: 21 by 14 inches.
 5. Body Access: 25 by 14 inches.
 6. Body plus Ladder Access: 25 by 17 inches.
- G. Install flexible connectors to connect ducts to equipment.

3.02 FIELD QUALITY CONTROL

- A. Inspections:
 1. Inspect locations of access doors and verify that purpose of access door can be performed.

END OF SECTION 23 33 00

SECTION 23 51 00

BREECHINGS, CHIMNEYS, AND STACKS

PART 1: GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Field Fabricated Metal Breeching and Chimneys for Engine Exhaust.

1.02 SUBMITTALS

- A. Product Data: For the following:
 - 1. Field Fabricated Metal Breechings and Chimneys
- B. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and seismic restraints, and location and size of each field connection.
- C. Welding certificates.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.
- D. Install Field Fabricated Metal Breeching and Chimneys in accordance with NFPA 37.

1.04 FIELD FABRICATED METAL BREECHINGS AND CHIMNEYS

- A. Description: Schedule 40 welded black steel pipe and fittings.
- B. Muffler/Silencer: Critical silence 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 18 dB at 500 Hz.
 - 2. Sound level measured at a distance of 10 feet (3m) from exhaust discharge after installation is complete shall be 75 dBA or less.
 - 3. Provide with stainless steel fittings, flanges and flexible piping connected to exhaust.
- C. Accessories: Provide metal vented thimble, 18" long stainless steel bellows, roof flashings, storm collars, support assemblies, spacers, flapper caps for a complete assembly.

PART 2: EXECUTION

2.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

2.02 APPLICATION

A. Field-Fabricated Metal Breechings and Chimneys: Steel pipe for use with engine exhaust.

2.03 INSTALLATION OF UNLISTED, FIELD-FABRICATED BREECHINGS AND CHIMNEYS

A. Suspend breechings and chimneys independent of their appliance connections.

B. Align breechings at connections, with smooth internal surface and a maximum 1/8-inch misalignment tolerance.

C. Slope breechings down in direction of appliance.

D. Lap joints in direction of flow.

E. Support breechings and chimneys from building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C-clamps, or beam clamps according to manufacturer's written instructions. Install all supports to allow for the full range of expansion and contraction.

F. Provide stainless steel flexible bellows at connection to engine.

G. Provide manufacturer's standard muffler. Provide pipe size adapters as required.

H. On vertical chimney terminators, terminate with flapper cap.

I. Install in accordance with NFPA 37 for anticipated exhaust air gas temperature of 1300 deg. F.

J. Install a metal ventilated wall thimble at the exhaust pipe penetration through the exterior wall/roof. The thimble shall be of sufficient length to extend a minimum 9" beyond the outside and inside faces of the exterior wall/roof. The outside diameter of the thimble shall be at least 12" larger than the outside diameter of the exhaust pipe.

K. The exhaust pipe and muffler shall have at least 9" of clearance to combustibles or greater if code requires.

L. Install a minimum 3" thick calcium silicate insulation on all pipe and muffler.

2.04 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.

C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 23 51 00

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1: GENERAL

1.1 SCOPE

- A. This section includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.
 - 6. Sleeves and seals for raceways.
 - 7. Fire-stopping.
 - 8. Concrete bases.
- B. This Section covers basic electrical requirements for providing labor, materials, equipment, and services necessary for the proper completion of all electrical work as shown on the drawings and specified herein. In general, this consists of wiring for light and power, installation of electrical systems, installation of lighting fixtures and any other equipment as hereinafter specified or required. Electrical work shall be complete with all documentation, wiring, conduit, fittings, equipment, and connections as specified or required. The omission of express reference to any items or work necessary for, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from providing such items or work.
- C. Conditions of the Contract (General and Supplementary Conditions) and Division 1, General Requirements, govern the Work of Divisions 26, 27 and 28 specification sections.
- D. This section applies to all work in Divisions 26, 27 and 28 specification sections.

1.2 DEFINITIONS

- A. The terms listed below are defined as follows only when used in Division 26, 27 and 28.
 - 1. Work: Labor and materials of the Contractor and/or Sub-contractor.
 - 2. Furnish: Obtain, coordinate, submit the necessary drawings, deliver to the job site in new condition and guarantee.
 - 3. Install: Receive at the job site, unload, store, set in place, connect, place in operation and guarantee.
 - 4. Provide: Furnish and install.
 - 5. Connect: Bring service to the equipment and make final attachment including necessary switches, outlets, connections, etc.
 - 6. Conduit: Includes, in addition to conduit, all fittings, pull boxes, hangers, and other supports and accessories related to such conduit.
 - 7. Concealed: Hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces or buried.
 - 8. Exposed: Not installed underground nor concealed as defined above.
 - 9. The building structure or building structural members consist of steel columns, steel beams, steel joists (top chord and at panel points), concrete walls and concrete block walls. Metal decking, joist bridging and bottom chords of bar joists shall not be construed as building structure or as a building structural member for the purpose of support.
- B. Provide Electrical work which is finished work, tested and ready for operation.
 - 1. Apparatus, appliances, material or work not indicated or any incidental accessories necessary to make the work complete and ready for operation, even though not specified nor shown on the drawings, are to be provided.
 - 2. Should there be any discrepancies or a question of intent, refer the matter to the Architect/Engineer for decision before ordering equipment or materials and before starting any related work.

3. Where work connects to that of another trade, or to wiring or equipment in place, take measurements in the field to make connecting work come true and line up with the item being connected.

1.3 CONTRACTOR

- A. The Contractor shall not employ a proposed project manager to whom the Owner or Engineer has made reasonable and timely objection. The Contractor shall not change the project manager without the Owner's consent, which shall not unreasonably be withheld or delayed.

1.4 INSPECTION OF SITE BEFORE CONSTRUCTION

- A. Before submitting a proposal on the work contemplated, bidder shall examine the site of the proposed work and thoroughly familiarize himself/herself with existing conditions and limitations affecting the performance of his work. No extra compensation will be allowed because of misunderstanding as to the amount of work involved or the bidder's failure to verify existing conditions which he could have discovered or reasonably anticipated prior to bidding. Contractor shall be responsible for any additional cutting, patching, mounting or installation modifications, etc., not called out on the drawings but required for the successful completion of the job.
- B. This includes any additional work required due to any existing jobsite condition (i.e., the construction of walls, ceiling spaces, clearances, available voltages, mounting requirements, existing equipment coordination, hazardous materials, etc) that the contractor had an opportunity to determine in the pre-bid walk-through and could have reasonably determined before the bid by visual inspection or by asking the Engineer or Owner. No additional money shall be awarded for additional work incurred caused by existing jobsite conditions which could have been verified by the contractor prior to bid. In addition, no additional money shall be awarded for failure to properly coordinate with other trades.

1.5 PLAN INTERPRETATION

- A. The plans are diagrammatic and indicate the arrangement of systems and equipment unless indicated otherwise by dimensions or detail plans of 1/4" = 1'-0" scale or larger. Refer to dimensioned plans for exact locations of building elements. However, field measurements take precedence over dimensioned plans. Report any differences discovered between electrical plans and the plans for other divisions. The installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings.
- B. Equipment outlines shown on detailed plans of 1/4" = 1'-0" scale or larger and/or dimensions indicated on the plans are limiting dimensions. Do not install any equipment that exceeds the equipment outlines shown or reduces indicated clearances.

1.6 SUBMITTALS

- A. Provide the following submittals.
 1. Shop Drawings shall be submitted for approval for equipment listed in the following Division 26, 27 and 28 sections.
 2. Samples of equipment or system components shall be submitted for examination/approval as requested.
 3. Instructions and Manuals. Provide on-site training and copies of instruction manuals to Owner designated personnel for operation, maintenance and warranty of electrical systems.
 4. Test Reports. Reports shall be submitted outlining the results of testing performed for the installed equipment as described herein.
 5. As-Built / Record Drawings. Keep layout plans for each system on the job site, marking changes made during installation. At completion of the project, this set of Record drawings shall be submitted as described herein.
 6. Warranty. Warranty information shall be submitted upon project completion.
 7. Rebates. Contractor shall provide all receipts as necessary for utility rebates and forward to Engineer / Owner. Contractor shall assist rebate application process by providing site data; including existing and proposed device / fixture counts and power usage.

1.7 PERMITS, LICENSES AND FEES

- A. The Contractor shall secure all permits and licenses, both temporary and permanent required for his work. The Contractor shall pay all fees and expenses required for the permits and licenses.
 - 1. The Contractor shall request inspections as required by regulating agencies and/or regulations. The Contractor shall pay all charges for inspections.
 - 2. Contractor shall furnish the Owner with a certificate of final inspection and approval by enforcement authorities. Include a copy of all permits pulled, signed for completion, in closeout documents.
 - 3. Comply with requirements of Division 00.
 - 4. Refer to 26 27 01 Electrical Utility Coordination for requirements pertaining to Utility fees.

1.8 QUALITY ASSURANCE

- A. Seismic Requirements:
 - 1. Refer to structural drawings for building classification requirements.
 - 2. Division 26 contractor is responsible for providing all required seismic devices and components as required for support and bracing for all boxes, conduit, lighting and equipment in accordance with the 2015 IBC, NFPA 13 and the local AHJ.
 - 3. Provide shop drawing submittals indicating locations and calculations of all seismic devices and components, signed and sealed by a Professional Engineer.
 - 4. All attachment points and installation instructions shall be supplied by equipment manufacturers.
- B. Workmanship - All Work on each system complying with these Specifications shall be carried out and/or managed by a competent firm. The respective contractor(s) shall be regularly engaged in the installation and testing of the system that is their responsibility. If requested, the Contractor shall furnish evidence of its qualifications to perform the Work specified. Evidence may be a listing of major lines of equipment for which the Contractor is a dealer. This evidence may also include a list of projects of similar scope and size that the Contractor has performed, including names of contacts and phone numbers for each project.
- C. Codes - Materials and workmanship shall comply with the most recently adopted applicable codes. As a minimum, codes include: All State and Federal laws, local ordinances, utility company regulations and requirements and recommendations of the following:
 - 1. State and Local Building codes
 - 2. Life Safety Code
 - 3. International Building Code
 - 4. Energy Code (IECC 2012/ASHRAE 90.1)
 - 5. State Industrial Commission Regulations
 - 6. State and Local Fire Codes and Regulations
 - 7. International Fire Code
 - 8. National Electric Code
 - 9. State and Local Electrical Codes
 - 10. Occupational Safety and Health Administration Regulations
 - 11. Environmental Protection Agency
 - 12. If these specifications with accompanying drawings are in any way at variance with these codes, the above cited codes shall govern and the Contractor shall make this installation accordingly, except where the drawings or specifications call for a higher quality of work than required by the Code.
- D. Standards - These shall be used where referenced by the following abbreviations:
 - 1. ADA: American Disabilities Act
 - 2. AIA: American Insurance Association
 - 3. AIA: American Institute of Architects
 - 4. ANSI: American National Standards Institute
 - 5. ASTM: American Society of Testing and Materials
 - 6. EPA: Environmental Protection Agency
 - 7. FM: Factory Mutual Insurance Association
 - 8. IEEE: Institute of Electrical and Electronic Engineers
 - 9. IES: Illuminating Engineering Society of North America

- 10. NBS: National Bureau of Standards
- 11. NECA: National Electrical Contractors Association
- 12. NEMA: National Electrical Manufacturers Association
- 13. NFPA: National Fire Protection Association
- 14. NEIS: National Electrical Information Standards
- 15. NSC: National Safety Council
- 16. OSHA: Occupational Safety and Health Act
- 17. TIA/EIA: Telecommunication Electronic Industry/Electronic Industry Association
- 18. UL: Underwriter's Laboratories

1.9 CORRELATION / COORDINATION OF WORK

- A. Consult the drawings and specifications of Mechanical and other trades for correlating information and lay-out work so that it will coordinate with other trades. Verify dimensions and conditions (i.e. finished ceiling heights, footing and foundation elevations, beam depths, etc.) with the Architectural and Structural drawings. If conflicts occur such that resolution is not possible by the affected trades on the job, the Architect/Engineer shall be notified so that the proper changes can be made to avoid extra cost to the Owner.
- B. Where work must be replaced due to the failure of the Contractor to verify the conditions existing on the job, such replacement must be accomplished at no cost to the Owner. This shall apply to shop fabricated work as well as to work fabricated in place.
- C. Throughout the course of the work, minor changes and adjustments to the installation may be requested by the Engineer. The Contractor shall make adjustments without additional cost to the Owner, where such adjustments are necessary, to the proper installation and operation within the intent of the Contract Documents. This does not include work already completed.
- D. Coordinate arrangement, mounting, and support of electrical equipment, so that connecting raceways, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- E. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- F. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Panels" and "Steel Doors and Frames."
- G. Coordinate electrical service connections to components furnished by utility companies. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electric-metering components. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- H. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface. Where acoustical ceilings and similar finishes will conceal electrical identification markings and devices, coordinate installation of these items before ceiling installation.
- I. Coordinate selection and application of firestopping specified in Division 07 Section "Firestopping".

1.10 CORRECTIVE PERIOD / GUARANTEE

- A. The Contractor shall guarantee and maintain the stability of work and materials and keep same in perfect repair and condition for the period of one (1) year after the Date of Substantial Completion of the Project.
- B. Defects of any kind due to faulty work or materials appearing during the above mentioned period must be immediately made good by the Contractor at his own expense to the entire satisfaction of the Owner and Architect and Engineer. Such reconstruction and repairs shall include damage to the finish or the building resulting from the original defect or repairs thereto.

- C. This guarantee shall not apply to injuries occurring after final acceptance and due to wind, fire, violence, abuse or carelessness or other Contractors or their employees or the agents of the Owner.
- D. This guarantee shall not apply where other guarantees for different lengths of time are specifically called for.

1.11 CONSTRUCTION LIGHTING & POWER SYSTEM – EXISTING BUILDING

- A. Existing building distribution systems shall be used for construction power.
 - 1. Contractor shall replace all receptacles, switches, coverplates, etc., damaged by any Contractor during the course of construction.
 - 2. Electrical energy costs shall be paid by the Owner.
 - 3. Materials furnished by the Electrical Contractor for the system shall remain his property and shall be removed when there is no longer any need for temporary light and power or when so ordered by the Architect.
 - 4. Provide and maintain lighting and receptacle outlets throughout the construction area in accordance with the following:
 - a. Lighting at the rate of one third watt per square foot with at least one outlet per room.
 - b. One (1) duplex receptacle per 2500 square feet of area.
 - c. All receptacles shall have ground fault protection.
 - d. Install the lighting and receptacle outlets throughout all areas of construction in an arrangement acceptable to the Architect and to the other trades. Connect maximum of three (3) duplex receptacles to one (1) 20A receptacle circuit.
 - 5. Overload protection for circuits and equipment of the temporary light and power system shall comply with the applicable codes relating to permanent work. Panelboards and other protective equipment shall be furnished and installed as required.

PART 2: PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS.

- A. Duly authorized distributors shall represent equipment and systems to be used on this project with service departments regularly engaged in the maintenance and installation of these systems and equipment. Such service departments shall regularly stock standard replacement parts and equipment and shall be located within a reasonable distance from the installation site.

2.2 MATERIALS

- A. Materials and equipment shall be listed, labeled, or certified by a nationally recognized testing laboratory, such as Underwriters Laboratories (UL). Materials and equipment shall be of current production by a manufacturer regularly engaged in the manufacture of such items from which replacement parts shall be available. When items are specified by manufacturer's name or catalog designation, it shall be understood that this is to establish the class, features, quality rating, duty and, in the case of visible building elements such as lighting fixtures, service fittings, control panels, and the like, appearance. Materials shall be consistent (identical manufacturer and model, unless otherwise noted) throughout all phases of the project.

2.3 APPROVAL / SUBSTITUTION OF MATERIALS

- A. Refer to General conditions and Division 01 for approval requirements.
- B. Refer to General conditions and Division 01 for substitution requirements.
 - 1. Where approved substitutes are used, the Contractor assumes responsibility for physical dimensions and other resulting changes. This responsibility extends to include extra work required by other trades as result of the substitution. Substituted equipment which requires additional costs by other trades in its application shall have such costs borne by the contractor furnishing the equipment.
 - 2. The Contractor shall assume any costs associated with the replacement of a non-specified product, unapproved by the Engineer, with an as-specified product.

2.4 MATERIAL PROTECTION

- A. Material and equipment shall be protected during shipment and storage against physical damage, dirt, moisture, cold, and rain. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operating and repainting if required. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement. Damaged paint on equipment and materials shall be refinished to the satisfaction of the Engineer.

2.5 OWNER'S RIGHT OF RETENTION

- A. Firmware, hardware, and software which is necessary to run the Project systems and/or equipment provided hereunder, shall become the property of the Owner. Such firmware, hardware, and software shall be upgradable and/or editable by the Owner to facilitate future functional changes and/or additions or deletions without cost or the need for second party software.

2.6 SLEEVES FOR RACEWAYS AND CABLES

- A. Provide sleeves for all cables passing through walls and floors. Provide sleeves for conduits passing through floors, footings, and/or exterior walls. Provide sleeves for conduits 1-1/4" and larger passing through walls.
- B. Provide sealing material at pipe sleeves that must be sealed against hydrostatic pressure, i.e. footing penetrations. Sleeve seals are usually furnished with EPDM sealing elements, plastic pressure plates, and carbon-steel bolts. NBR and silicone sealing elements, carbon- and stainless-steel pressure plates, and stainless-steel bolts are available for special applications.
- C. Sleeves for penetrations through rated walls and floors shall conform to the requirements of Specification 07 84 00 "Firestopping".

2.7 FIRESTOPPING AND SEALS

- A. Seal all openings around conduit or other electrical work penetrating fire and smoke rated partitions, floors, and ceilings. Firestop material shall comply with UL 1479, NEC 300-21, and NEC 800-3(c), and conform to the requirements of Specification 07 84 00 "Firestopping".
- B. All sleeves and conduits penetrating walls built to deck require sealant. Refer to Division 07 Section "Sealants and Caulking" for materials and installation. Refer to Architectural Details for more information.

2.8 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.
 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 7. For interior applications, use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03.
 8. For exterior applications, use 4500-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 and 32.

PART 3: EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Material, equipment, or systems as shown and/or specified shall be new and installed in accordance with manufacturer's recommendations and industry standards as applicable. Electrical Work shall be installed in a professional, neat, workmanlike manner, as per NECA / NEIS. Electrical equipment shall be adequately and securely mounted and supported.
1. Outdoor/Underground/Wet. All electrical Work installed where subject to the elements and/or water, wash down areas, shall be rated for such areas.
 2. Hazardous Locations. All electrical Work installed in classified hazardous areas, i.e. paint storage, shall be rated for such areas.
 3. Penetrations. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Resident Engineer prior to drilling through structural sections. Electrical Work installed between different environments shall be sealed to prevent moisture or contaminants from traveling from one area to another.
 4. Grounding / Bonding. Electrical equipment and materials shall be grounded and bonded in accordance with NEC Article 250 and as specified herein or on the drawings.
 5. Fireproofing. Electrical materials and equipment shall be installed so as to prohibit the spread of fire. Fire-stop wall, floor, and ceiling penetrations to the same fire-rating as the penetrated wall, floor, or ceiling.
 6. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
 7. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
 8. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
 9. Right of Way: Give to piping systems installed at a required slope.
 10. All labeling, identification or programming related to room numbering shall follow the Owner's final room numbering scheme. Obtain documentation of Owner's final room numbering prior to final labeling and/or programming. Identification of all systems shall utilize Owner's final room numbers.
- B. Cutting and Patching
1. Perform and provide all cutting and patching of building materials as required for the installation of the work. No structural members shall be cut without the written approval of the Engineer/Architect and any such cutting shall be done in a manner satisfactory to the Engineer/Architect.
 2. All patching of or repair of damage to work in place shall be done in a neat and workmanlike manner with the approval of the Engineer/Architect. The Contractor whose operations require cutting of work in place, or who cause damage which entails repairs of such work, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay all costs of such patching or repair.
 3. All holes through pre-cast concrete shall be drilled. Coordinate all pre-cast locations on the architectural and structural drawings.
 4. Contractor shall be responsible for any additional cutting, patching, mounting/installation modifications, etc., not called out on the drawings but required for the successful completion of the job. This would include additional work required due to any existing jobsite condition (i.e., the construction of walls, ceiling spaces, clearances, available voltages, mounting requirements, existing equipment coordination, hazardous materials, etc) that the contractor had an opportunity to determine in the pre-bid walk-through and could have reasonably determined before the bid by visual inspection or by asking the Engineer or Owner. No additional money shall be awarded for additional work incurred caused by existing jobsite conditions which could have been verified by the contractor prior to bid. In addition, no additional money shall be awarded for failure to properly coordinate with other trades.
 5. Grout – Non-metallic, shrinkage resistant grout: ASTM C 1107, factory packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

- C. Excavation, Backfill, and Concrete
 - 1. Provide trenching, excavation, and backfill required for the electrical work. Repair all streets, sidewalks, lawns, curbs or paved areas damaged during / due to work. Sub-surfaces and finished surfaces shall be constructed equal to existing conditions of adjacent materials.
 - 2. Where concrete work is provided by the electrical contractor, concrete shall have compression strength of 4000-psi at 28 days and shall contain 4% to 6% air entrainment.

3.2 PENETRATIONS

- A. Penetrations - Where raceways pass through fire partitions, fire walls, or smoke partitions, then provide firestopping seals as specified in Division 07 Section "Penetration Firestopping".
- B. Where multiple low-voltage conduits penetrate a full-height-to-structure partition (sound wall), and the area of such conduits is equivalent to or greater than (1) 4" conduit, then provide firestopping seals as specified in Division 07 Section "Penetration Firestopping".
- C. Roof Penetrations: Conduit penetrations directly through roof membrane are prohibited. Route conduits through equipment curb or provide roof penetration assembly per architectural details.

3.3 FIRESTOPPING

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

3.4 INSTALLATION OF SLEEVES

- A. Coordinate sleeve locations.
 - 1. Where raceways pass through floors, floors shall be core drilled and appropriately sized sleeves shall be installed. Sleeves shall terminate not less than 3 inches above floor slabs and not less than 3 inches below the ceiling of the floor below. Completely seal clearances between the raceway and sleeve, and make watertight. Low-voltage sleeves shall be bushed.
 - 2. Schedule 40 pipe sleeves shall have at least three (3) concrete anchors.
 - 3. Set all sleeves true to line, grade and position and plumb or level after concrete is poured. Correct any deviation from proper position.
 - 4. Provide galvanized steel tube sleeve 1 1/2" larger than O.D. of conduit. Sleeve shall have wall thickness of 0.061 inches.
 - 5. Where conduits pass through exterior concrete walls below grade, caulk both sides with oakum and lead wool or otherwise adequately waterproof the openings around the conduit.
 - 6. Caulk spaces between pipe and floor sleeves inside the building with a waterproof caulking material. Spaces between pipe and exterior partition sleeves shall be caulked with fiber glass insulation.
 - 7. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 8. Aboveground, Exterior-Wall Penetrations: Seal penetrations using pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 9. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.5 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products to be installed or turned over to Owner.

- B. Store material and products in a clean and dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect products from dirt, water, construction debris, and traffic. Material and equipment shall be protected during shipment and storage against physical damage, dirt, moisture, cold, and rain. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operating and repainting if required. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement. Damaged paint on equipment and materials shall be refinished to the satisfaction of the Architect/Engineer.

3.6 CLEAN UP

- A. Contractor shall at all times keep the premises free from accumulation of waste material or rubbish caused by his employees or work. Upon completion of the work he shall remove his rubbish, tools, scaffolding, and surplus materials from and about the building, and shall leave his work areas "broom clean" or its equivalent. Electrical equipment shall be cleaned with temporary identification removed. In case of dispute the Owner will remove the rubbish and charge the cost to the Contractor.
- B. After tests have been made and accepted, the Electrical Contractor shall go over the whole job and clean light fixtures, panels and other equipment installed by him/her, leaving the entire plant in a clean and complete working order.

3.7 PAINTING

- A. Refinish all electrical equipment damaged during shipping and/or installation to its original condition. Remove all rust; prime, and paint per manufacturer's recommendations for finish equal to original.

3.8 FIELD TESTS AND ADJUSTMENTS

- A. Work shall, upon completion, be subjected to such tests as are required under industry standards and/or specified herein. Acceptance of the Work by the Engineer shall be contingent upon satisfactory completion of these tests. Actual tests required shall be specified under their respective sections.
- B. Prior to completion, the Work shall be subjected to a careful and thorough visual inspection to detect erroneous or loose connections, presence of foreign objects or materials, poor workmanship, incorrect ratings of overcurrent protective devices or equipment, compliance with drawings, or other abnormal conditions.
- C. Tests shall be scheduled in advance so that a representative of the Engineer may be present. Test Reports shall be tabulated by the Contractor including the pertinent readings or observations, as well as a statement of the method and specific equipment employed, and shall be filed with the Engineer as part of the permanent Project record. In cases of test failure, it shall be agreed that the corrective measures proposed are adequate before making repairs. A second test shall be conducted upon completion of repairs, adjustments, or replacements.
- D. The Contractor shall provide calibrated test equipment and temporary energy sources as required for tests.

3.9 SUBMITTALS

- A. The Contractor shall submit the following information to the Engineer:
 - 1. Shop Drawings shall be first checked by the Electrical Contractor for space/dimensional considerations, performance characteristics, and general conformance to these plans and/or specifications, and shall be so stamped.
 - a. Shop drawings not stamped as specified will be returned to the Contractor without action. Contractor's stamp shall include his corporate name and address, the name of the checker, and the date. They shall then be sent to the General Contractor (as applicable) who will stamp them and forward to the Engineer.
 - b. One copy of the shop drawings for any item shall be submitted to the Engineer for approval. Drawing size shall be no larger than 11" x 17".
 - c. Submittals shall be grouped according to specification Section or categories and shall be labeled with the proper name of the project and specification Section. Partial submittals of a group or category will not be reviewed (e.g., submit all panels, all lighting fixtures, etc.).

2. Test Report. Copy of test report, as detailed above, shall be submitted.
3. As-Built / Record Documents. A set of construction documents shall be continuously marked during progress of construction to show actual circuit routing and makeup, equipment location changes, and variations between the project work, record-drawings, and the Contract documents. Such markings shall be made neatly and legibly with red felt-tipped pen. Submit with operation, maintenance and warranty data manuals.
4. Installation and Maintenance Manuals. Copies of Installation Instructions and Operation, Maintenance and Warranty Data Instruction Manuals shall be furnished for electrical equipment furnished. These Manuals shall include parts lists, troubleshooting methods, lubrication recommendations, and calibration instructions. Manuals shall be made up with hard cover post type binders such as Federal 'Super-Lok.' Large sheets shall be neatly folded and installed with posthole reinforcements such that the sheets will unfold without need to open binder posts. Manuals shall include index, section tabs, approved shop drawings, installation, operation, maintenance and warranty data instructions packed with equipment, parts lists, and any other data as necessary and/or appropriate for the user to have.
5. Software. Prior to project completion, and before final payment is made, the Contractor shall provide the Owner a hard copy printout of any PLC code and electronic media copies of PLC code and SCADA software, etc.

3.10 COMPLETION OF INSTALLATION

- A. System Acceptance. System optimization shall be performed to make sure that each electrical system is properly installed and that all components are working properly. This shall include, but not be limited to:
 1. Equipment is functioning properly.
 2. Equipment is mounted in the correct location.
 3. Equipment is rigidly and securely mounted.
 4. Equipment is installed in a neat and visually professional manner.
 5. Equipment is clean.
 6. The training of operations personnel is complete.
 7. Final Inspection. Upon completion of the work, notify the Engineer that the Project is complete and ready for inspection. The Engineer will schedule an inspection and generate a list of items to be corrected or completed before contract closeout. If the Engineer is requested to make a final inspection by the Contractor, and the Engineer finds work is not complete enough to perform that inspection, the Contractor will compensate the Engineer for their time. The Contractor will then perform the necessary work to complete the project and again request a Final Inspection.
- B. Training. The Contractor shall furnish training for the operating and maintenance personnel of the Owner of the recommended and proper operation and maintenance of electrical systems. Training shall be both of the classroom type and the hands-on type, and shall cover all areas of maintenance and operation. Training shall be coordinated with the Engineer and Owner to allow videotaping, if requested by Owner.
 1. The training period may be either concurrent with the system start-up or follow the start-up period at the Contractor's option; however, if it is given concurrent to the start-up, then the instructing personnel shall be furnished in addition to the start-up personnel and one shall not interfere with the other.
 2. Actual training periods and their scopes shall be specified under their respective Section. Scheduling of the Owner's personnel shall be mutually agreed upon between the Contractor and the Project Engineer.
- C. Cleanup. Keep the premises free from accumulation of waste material and rubbish. Remove debris from the job site and leave work areas broom clean upon completion of the work.
- D. Spare Parts. Spare parts shall be turned over to the Owner at the completion of the Project. The spare parts shall not be used during start-up or warranty. Package spare parts for protection against dirt and moisture.

3.11 GUARANTEE (WARRANTY).

- A. Unless specified in another Section, the warranty shall be described herein. The Contractor shall guarantee the equipment and systems to be free of defects in design, equipment, and workmanship for a period of one year from the date of acceptance as issued by the Architect's certificate of completion. The Contractor shall replace, redesign, and correct any equipment that fails within the one-year period.

END OF SECTION 26 05 00

SECTION 26 05 03

ELECTRICAL DEMOLITION

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes all labor, material, equipment, and services necessary and incidental to complete all the demolition and removal of all electrical systems as noted on the Drawings.

1.2 EXAMINATION

- A. Examine the building to determine actual conditions and report any significant discrepancies with the Architect/Engineer for clarification. These examinations should include verifying field measurements, circuiting arrangements, and wiring that will be abandoned and that serves only abandoned equipment. Where new additions or penthouses are being constructed by this project that create openings in ceilings areas or roof, field visit the site to determine extent of conduit/wire relocation work and include in Bid.
- B. Contractor shall assume in his bid that existing equipment and fixtures to be reused are in good working condition and can be installed without any repairs. If certain items are found to be in need of repair or in unusable condition, Contractor shall notify the Engineer for decision. However, Contractor shall be responsible for any damage caused by him to equipment in removal or handling.
- C. The Electrical Contractor shall review the electrical equipment in and around the areas in which demolition work is to be performed. The Electrical Contractor shall submit a written list of items not working or broken to the Architect/Engineer. Upon completion of work, any electrical items not working or broken shall be the Electrical Contractor's responsibility to repair, unless noted on a list submitted prior to the start of demolition. If no such list is submitted to the Architect/Engineer prior to the start of demolition, the Electrical Contractor shall be made responsible to provide all equipment in working order at the end of the remodeling.
- D. Contractor shall be responsible for any additional demolition not called out on the drawings but which is required for the successful completion of the job. This is work required due to an existing jobsite condition (i.e., the construction of walls, ceiling spaces, hazardous materials, etc) that the contractor had an opportunity to determine in the pre-bid walk-through and could have reasonably determined before the bid by visual inspection or by asking the Architect, Engineer, or Owner. No additional money shall be awarded for work caused by existing conditions which could have been verified prior to bid.

1.3 SUBMITTALS

- A. Provide documentation of hazardous waste being turned over to a certified hazardous waste disposal company.
- B. Provide written report of all findings where inspection is specified of existing equipment to be reused.

PART 2: PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3: EXECUTION

3.1 GENERAL INFORMATION

- A. Provide demolition of all existing electrical facilities as shown on the drawings, or required. This includes, but is not limited to, lighting, power, and signal equipment. Existing electrical equipment to be reused is noted on the drawings.
- B. Equipment, panelboards, and connections that are not intended to be demolished shall be maintained. Feeders and connections shall be protected and remain in use throughout the construction process.

3.2 CONTINUITY OF SERVICES

- A. If the Owner will be occupying the existing building during construction, provide any temporary connections necessary to maintain services to the existing systems. Provide advance notice of a minimum of four weeks to the Owner of any temporary service outages. Advance notice shall be in writing with copies to the Engineer or Architect/Construction Manager.
- B. Coordinate utility service outages with Power Utility Company.
- C. Phase all demolition activities to coordinate with the general construction and other trades' schedules to minimize disruption to other trades and downtime to Owner.
- D. Provide temporary wiring and connections to maintain continuity to existing systems in service during construction. Work must not be performed on energized equipment or circuits.
- E. Refer to other specification sections for continuity of services and systems during construction.
- F. Electrical circuit continuity shall be maintained where a device is removed from the circuit. Retrofit the circuit with conductors and raceways as required maintaining the connection to all devices that remain.
- G. Where a wall is demolished and devices are shown on the demolition plans as being demolished, it shall be the responsibility of the contractor to relocate circuitry as needed to maintain connectivity to devices upstream and downstream.
 - 1. The Contractor shall bear costs associated with this work, including core drilling of floor, assuming the following conditions:
 - a. The re-routing path is less than 40' (combined horizontally and vertically).
 - b. No cutting and patching of floor is required.
 - c. The ceiling below is accessible.
 - d. The conduit consists of 3/4" conduit or less containing branch circuitry with line voltage wiring, or low voltage wiring that can be spliced.
 - e. The amount of rerouting required is not disproportional to the scope of the project.
 - 2. The Contractor may submit a claim for additional costs where conditions deviate from the above, such as longer route, cutting and patching is required, home runs or larger conduits are uncovered, etc.

3.3 DEMOLITION AND REMODEL WORK

- A. Demolish and extend existing electrical work under Provisions of Section 02 41 19, "Selective Demolition" and this section, and as indicated on the Drawings. The Owner shall be offered materials and equipment slated for demolition. Legally dispose of all demolition material and equipment that the Owner has been offered but has not accepted.

- B. Coordinate the demolition and/or installation of items by other trades to minimize the effect on existing electrical items to remain. E.C. shall relocate, reroute and/or replace materials needed to maintain existing electrical continuity and/or to maintain accessibility to j-boxes and other access points required by Code. Where modifications require new access panels, the E.C. shall provide them and coordinate size and location with other trades.
- C. When connections to existing outlets (light fixtures, switches, receptacles, motors, other devices, etc) are removed, remove all unused wire and raceway, where accessible, back to last active outlet or source. Extend existing circuiting, if required, to continue circuiting to other areas.
 - 1. Devices. Remove all devices in areas that will be remodeled as shown on the drawings. Replace all devices and cover plates in outlets that shall remain. When outlets in walls, ceilings, or floors are being removed that are essential for the operation of other remaining outlets, provide new wiring devices in relocated outlets. Disconnect abandoned flush outlets and remove devices. Provide blank covers for all abandoned boxes and openings.
 - 2. Lighting.
 - a. Remove all abandoned lighting fixtures in areas that are to be remodeled as shown on the drawings.
 - b. Temporarily remove fixtures that are to be reconnected as shown on the drawings. These fixtures shall be cleaned and reinstalled with new ballasts and lamps. If conduit and wiring serving these fixtures must be removed to permit demolition work, provide new conduit and wire to obtain the same circuiting arrangement as originally existed.
 - c. Wiring. Remove all wire wherever existing circuits are abandoned or modified. Install new conductors for all altered or remodeled circuits.
 - 3. Raceways. Remove abandoned raceways and boxes when exposed or when they interfere with new work of any trades, unless indicated or approved otherwise. When electrical materials are removed, patch and finish building surfaces to match existing finishes. If ceilings are exposed at any time during construction then abandoned raceways must be removed.
 - 4. The Electrical Contractor shall remove / protect existing low-voltage cables in areas affected by the demolition. When remodeling is complete, the Electrical Contractor shall reinstall / remove protection of low-voltage cables and confirm all electrical devices and cables are restored to their original working conditions.
 - 5. Permission. Obtain permission in writing from the Owner before interrupting services, branch circuits, communications, or other systems.
- D. No portion of the electrical or communication systems may be abandoned in place. Remove all electrical material to a previous point of usage.
- E. The existing distribution system shall be modified as indicated on the plans and specified herein. The revised system shall be complete and continuous with all superfluous equipment and connections which are not maintained to be removed.
- F. Existing circuits to be extended beyond the existing wall, ceiling, or floor to be removed shall be replaced with new conduits and conductors as required. Reroute the existing circuit, or serve the remaining devices from another electrical source to maintain the circuit and device functionality.
- G. Where ceilings are to be lowered and ceiling-mounted equipment, fixtures and devices are to be reused, extend cabling as required to new locations.

3.4 DISPOSITION OF EXISTING MATERIAL AND EQUIPMENT

- A. All material and equipment, which is noted, specified, or required by the Owner to be salvaged, and is not scheduled to be reused or relocated, shall be carefully removed, delivered to the Owner, and stored where directed on site.
 - 1. Carefully remove and store on site all material and equipment noted or specified to be reused or relocated. Thoroughly clean this equipment prior to installation.
 - 2. Remove and properly dispose of all other materials or debris resulting from demolition operations from the site.

3.5 LAMP AND LIGHT BALLAST DISPOSAL PROCEDURE

- A. The Contractor shall be responsible for disposing of the existing ballasts and lamps slated for demolition. Ballasts and lamps removed under this contract for demolition shall be kept intact, boxed and delivered to a certified hazardous waste disposal services and lamps to a certified hazardous lamp recycle service. Provide Owner with proper documentation for this work.
- B. It is anticipated that no hazardous material, PCB ballasts, will be encountered; however, if some are found, they shall be packaged and stored on site for disposal by Owner and/or handled as described below.

3.6 SALVAGED MATERIALS

- A. All existing materials and equipment noted, specified, or required to be salvaged and which are not scheduled to be reused, shall be carefully removed and handled to minimize damage. The contractor shall be moved or delivered where directed by the owner.
- B. All existing material to be reused shall be carefully removed and stored in a dry location to minimize damage.

3.7 CLEANING AND REPAIR

- A. All patching of or repair of damage to work in place shall be done in a neat and workmanlike manner with the approval of the Engineer/Architect. The Contractor whose operations require cutting of work in place, or who cause damage which entails repairs of such work, including wall/paint finish, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay all costs of such patching or repair.
- B. Switchboards and Panelboards: For switchboards, panelboards, and other existing equipment that is modified within the project scope, replace any damaged circuit breakers and provide closure plates for any vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: In areas of remodel clean existing luminaires on all exterior and interior surfaces and replace all lamps, ballasts, and broken electrical parts.

3.8 INSTALLATION

- A. Reinstall relocated equipment and materials under the provisions of Division 01 and 02.

END OF SECTION 26 05 03

SECTION 26 05 19

ELECTRICAL POWER CONDUCTORS

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples of any or all proposed equipment or system components shall be submitted for examination/approval as requested.
- C. Field quality-control reports.

1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. ANSI / ASTM B3 – Annealed Bare Copper Conductor
 - 2. ICEA – Insulated Cable Engineer’s Association
 - 3. NEMA WC 5 – Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
 - 4. NEMA WC 70 – Nonshielded Power Cables Rated 2000 Volts or Less
 - 5. UL 44 – Standard for Rubber-Insulated Wires and Cables (includes XHHW)
 - 6. UL 83 – Standard for Thermoplastic-Insulated Wires and Cables

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.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory’s label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards. General Indoor Purpose = THHN/THWN; Outdoor in conduit = XHHW; Outdoor exposed = Sunlight resistant; Plenum rated; etc.

2.2 CONDUCTORS

- A. Copper conductors only.
- B. Conductors shall be UL listed.
- C. The conductors shall be annealed (soft) copper having a conductivity of 98% pure copper, 600 volt minimum rating and meet or exceed all applicable ASTM, NEMA, UL, ICEA specifications.

2.3 SPLICES, TAPS, AND TERMINATIONS

- A. Splices, taps and terminations shall be in accordance with UL and NEC.
 - 1. For conductors 8 AWG and smaller, provide "crimp-on" or "wire-nut" self-insulating connectors, 600V, 105-degrees C. Integral insulator shall completely cover exposed conductors.
 - 2. For copper conductors 6 AWG and larger, provide pressure or compression type connectors (indent, hex screw, or bolt clamp-type) with snap-on insulating covers.
 - 3. Reusable lever-operated push-wire connectors are allowed for listed applications. Non-lever push-wire connectors are prohibited.

2.4 METAL CLAD CABLE

- A. Metal clad (MC) cable SHALL NOT be used on this project except for lighting whips (MC or MC-LED), unless specifically noted otherwise.
- B. MC assembly shall include an insulated green equipment-grounding conductor, sized in accordance with the NEC. The outer metal armor or sheath of the assembly shall be approved and identified as an acceptable grounding return path.
 - 1. Comply with NEMA WC 70 for metal-clad cable, Type MC.
 - 2. Provide factory assembly of two or more current carrying copper conductors enclosed in a metallic sheath, aluminum or steel interlocked armor core or continuous, corrugated, aluminum tube.
 - 3. Conductors and insulation shall conform to the requirements for single conductor insulated wire.
 - 4. Anti-short bushings shall be installed per manufacturer.

PART 3: EXECUTION

3.1 GENERAL INFORMATION.

- A. Conductors and cables shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Conductors 8 AWG and larger shall be stranded per N.E.C. No conductor smaller than 12 AWG shall be used unless specifically noted.
 - 1. 600V Feeder Conductors - Type THHN/THWN in conduit.
 - 2. Branch Circuit and Control Conductors - Type THHN/THWN in conduit.
 - 3. 600V Feeder, Branch Circuit and Control Conductors Installed Underground or Outdoors in Conduit - Type XHHW.
 - 4. Control Cable (Low-Voltage) – 600V, 16-gauge, plenum rated heavy-duty multi-conductor type, with PVC/nylon insulation over each conductor, color coded, and PVC overall jacket.
- C. Cord Drops and Portable Appliance Connections – Type SO, hard service cord with stainless-steel, wire-mesh, strain-relief device at terminations to suit application.
- D. All home runs and feeders shall be in conduit.

3.2 INSTALLATION OF CONDUCTORS

- A. General:
 - 1. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
 - 2. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- B. Installation of 600V Conductors (>100V)
 - 1. Install conductors in accordance with the NEC and as specified. Install all wiring in raceway systems unless specified otherwise.

2. 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.
3. Conductors shall not be pulled in by any manner likely to injure the insulation. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
4. Swab underground raceways, 1-1/4" and larger, with sponge and drawstring before conductor installation.
5. Splice conductors only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.
6. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
7. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form and train the conductors.
8. Seal conductors with a non-hardening approved compound at transitions between two different temperature locations. I.E. Entering a building from underground.
9. All conductors are 12 AWG copper unless indicated or specified otherwise. All conductor sizes indicated on the drawings are based on copper conductors. Do not substitute smaller conductors with higher temperature rated insulation. Verify conductors are sized per 3% energy code voltage-drop requirements.
10. Maximum number of conductors in raceways and boxes shall conform to the latest edition of the National Electrical Code with the following exception: Do not fill 1/2" conduit to more than 25% fill.
11. All line to neutral loads shall have dedicated neutrals, separate neutrals for each phase conductor.
12. 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.
13. Wiring at Outlets: Install conductor at each outlet, with at least 8 inches of slack.
14. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
15. Multiwire branch circuits are prohibited.
16. Secondary service, feeder, and branch circuit conductors shall be color coded as follows:

| 208/120 Volt | | Phase | 480/277 Volt | |
|--------------|---------------------|-------|--------------|----------------------|
| Ungrounded | Neutral | | Ungrounded | Neutral |
| Black | White / Blk tracer | A | Brown | Gray / Brown tracer |
| Red | White / Red tracer | B | Orange | Gray / Orange tracer |
| Blue | White / Blue tracer | C | Yellow | Gray / Yellow tracer |

- C. Installation of Control Voltage Conductors (<100v).
1. Install conductors in accordance with the NEC, and as specified. Wiring splices shall be avoided and, if necessary, must be installed only in junction boxes. (Instrumentation and shielded control cables shall be run continuous from origin to termination.) All system junction boxes and any spliced cable must be labeled. Neatly form and train the conductors inside control panels.
 2. Cables shall be installed in conduit in the following locations:
 - a. Where required by a system specification or plan note.
 - b. Where cables are subject to physical damage or in corrosive atmospheres.
 - c. Where cables are concealed within inaccessible walls or ceilings.
 - d. In mechanical spaces and exposed storage areas.
 - e. On existing unfinished walls below structural ceiling.
 3. Where systems are allowed to be free-air, plenum rated cabling may be installed without a raceway as follows:
 - a. Align and run cables parallel or perpendicular to the building lines. Cable shall be supported at least every 5 feet. Whenever possible, cables shall be grouped together. Install horizontal runs close to the ceiling, beams, or structure and secure with appropriate supports. Cable shall be independently supported by cable tray, dedicated j-hooks, or equivalent (tie-wraps are not equivalent). Cable shall not tie off to other conduits or devices.
 - b. In a False Ceiling Environment, cable supports shall be mounted a minimum of 3" above the ceiling grid supporting the false ceiling. Cables routed in a suspended ceiling shall not be draped across the ceiling. Cable supports shall be provided by means that are structurally independent of the suspended ceiling, its framework, or supports.

- c. Cabling, which runs parallel with electric power or lighting, conduits/conductors and is less than or equal to 480V, shall be installed with a minimum clearance of 2".
- d. Cabling shall maintain a minimum clearance of 10' from power cables in excess of 480V.
- e. Cabling must not be supported by ductwork or piping.
- f. Cabling must be installed to allow for seasonal building expansion and contraction.
- g. The Contractor shall observe the manufacturer's bending radius and pulling strength requirements of the cable during handling and installation.
- h. The Number of Horizontal Cables placed in a cable support or pathway shall be limited to the number of cables that might cause a deformation of the standard geometric shape of the cables.
- i. Cable Penetrations through partitions or walls shall be provided with a sleeve and appropriate sealants where required.

3.3 INSTALLATION OF MC CABLE

- A. For Luminaires: MC and MC-LED cables are allowed as branch-circuit wiring from junction boxes to luminaires. Daisy chaining of luminaires with cable is prohibited. There shall be a maximum of four MC terminations per junction box.
- B. Cable shall not be used in exposed locations.
- C. MC Cable Installation:
 - 1. Install conductors in accordance with the NEC and as specified. Flattened, dented, deformed, or opened armor is not permitted. If damaged during installation, damaged cables shall be replaced with new undamaged material. Cut square with manufacturer's armor stripping tool and remove burrs. Remove enough armor from cable to permit sufficient conductor to extend into the enclosure. Cable shall be mechanically and electrically continuous. Secure cable to equipment, junction boxes, and outlet boxes with fittings approved for grounding. Cables shall be run parallel or perpendicular to the building lines.
 - 2. Bends. Bends shall be made so that the cable is not damaged. The radius of the curve of the inner edge of any bend shall not be less than five times the diameter of the cable.
 - 3. Cable Supports. The cable shall be secured by approved straps, hangers, or similar fittings designed and installed as to not damage the cable. Independently support the cable or install in cable trays. Do not use other supports, i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts.

3.4 SPLICES, TAPS, AND TERMINATIONS

- A. Install electrical connectors and terminals according to manufacturer's published instructions.
 - 1. Splice / terminal connections shall be mechanically and electrically secure.
 - 2. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 3. Installation of compression connectors shall be with manufacturer recommended tools. The crimper shall be mated to the crimp.
 - 4. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
 - 5. 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.
 - 6. Terminate spare conductors with wire nuts and electrical tape.

3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- C. Coordinate selection and application of sleeve seals as specified in Division 07 Section "Firestopping".

3.6 FIRESTOPPING

- A. Coordinate selection and application of firestopping specified in Division 07 Section “Firestopping”.

3.7 FIELD QUALITY CONTROL

- A. Contractor shall field inspect and test conductor installation as follows.
 - 1. Inspect wire, cable, and/or cord for physical damage and proper connection / termination.
 - 2. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning conductors and cables at project site, where possible, and re-test to demonstrate compliance; otherwise, remove and replace with new units and retest.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and before electrical circuitry has been energized, test feeder conductors, and conductors feeding critical equipment and services 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. Continuity Testing:
 - a. Prior to energizing, test wires and cables for electrical continuity, short-circuits and grounds. Verify proper phasing connections.
- D. 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.
 - 4. Include results in the Operation, Maintenance and Warranty Data Manuals.
- E. Remove and replace or re-terminate malfunctioning conductors and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1: GENERAL

1.1 SCOPE

- A. This Section covers basic electrical requirements for providing labor, materials, equipment, and services necessary for the proper grounding and bonding of electrical work as shown on the drawings and specified herein.
 - 1. Grounding conductors and connectors.
 - 2. Grounding bus bar.
 - 3. Grounding electrodes.

1.2 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for equipment as follows:
 - 1. Grounding bus bar.
 - 2. Grounding electrodes.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For inclusion in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Test Data: Results of grounding test results.

1.4 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. ANSI / ASTM B3 & B8 – Annealed Bare Copper Conductor
 - 2. ANSI/TIA-607-C: Generic Bonding and Grounding (Earthing) for Customer Premises
 - 3. BICSI TDMM 13th Edition Chapter 8 – Bonding and Grounding (Earthing)

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.2 GROUNDING CONDUCTORS AND CONNECTORS

A. Conductors:

1. Insulated Conductors: Copper wire insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
2. Bare Copper Conductors: ASTM / UL.

B. Connectors:

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

2.3 GROUNDING BUS BAR

- ### **A. Grounding Bus Bar:** Rectangular bars of tin-plated copper, 1/4 by 4 inches in cross section, unless otherwise indicated; with insulators.

2.4 GROUNDING ELECTRODES

A. Grounding Rods:

1. Ground Rods – Copper clad steel, 3/4" diameter, 10' long.

PART 3: EXECUTION

3.1 GENERAL INFORMATION

- ### **A. Grounding shall be in accordance with NEC Article 250.**
- ### **B. Grounding and bonding shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.**
- ### **C. Equipment grounding conductors shall be installed in all conduits.**

3.2 APPLICATIONS

- ### **A. Equipment Grounding Conductor Application:** Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.
1. Provide ground wire in all raceways as the equipment ground conductor.
 2. Conductors: Install solid conductor for No. 14 AWG and smaller, and stranded conductors for No. 12 AWG and larger, unless otherwise indicated.
- ### **B. Underground Grounding Conductors:** Install bare copper conductor, No. 4/0 AWG minimum.
1. Bury at least 24 inches below grade.

2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors, except as otherwise indicated.
 3. Connections to Structural Steel: Welded connectors.
- D. Grounding Bus Bar: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated on
1. Install bus on insulated spacers 1 inch minimum, from wall, 6 inches above finished floor, unless otherwise indicated.
- E. Grounding at the Service: Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
- F. Separately Derived Systems:
1. Generators Connected with 3-Pole Transfer Switch: Ground generator at its ground grid connected to the building service ground. Provide ground conductors and bond the generator to the electrical service per NEC.
 2. Generators Connected with 4-Pole Transfer Switch: Install grounding electrode in the form of ground rod at the generator location to establish separately derived ground at generator. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.
- G. Bonding of Piping Systems and Exposed Structural Steel: Where required by NEC to be grounded, provide bonding in accordance with NEC paragraph 250.102. (Including bonding to separately derived system.)
- H. Signal and Communications: For telephone, alarm, and communication systems, provide a No. 4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet or central equipment location.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

3.4 INSTALLATION

- A. General: Ground electrical systems and equipment in accordance with NEC requirements, except where the Drawings or Specifications exceed NEC requirements.

- B. Provide and install grounding electrode systems according to NEC Article 250. Route insulated grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated. Bond the following items together to form the service entrance ground:
1. Building steel. Connect ground electrode structural steel components that is connected / bonded to earth.
 2. Concrete encased electrode (Ufer).
 - a. Ufer Ground (Concrete-Encased Grounding Electrode) Footing Steel: Fabricate with 20 feet of conductor laid lengthwise in excavation for foundation or footings. Install so conductor is within 2 inches of the bottom of the concrete. Where base of foundation is less than 20 feet in length, coil excess conductor at base of foundation. Bond conductor to reinforcing steel at four locations, minimum. Extend conductor below grade and connect to building grounding grid or grounding electrode.
 3. Secondary Bonding Busbar (SBB): Provide bonding busbar supported 96 inches above finished floor, except as otherwise indicated.
- C. Bonding:
1. Bond interior metal piping systems and metal air ducts to equipment ground conductors of pumps, fans, electric heaters, and air cleaners serving individual systems.

3.5 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 (where cables are allowed by Section 260519 Low-Voltage Electrical Power Conductors and Cables).
 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.6 CONNECTIONS

- A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
1. Provide electroplated or hot-tin-coated materials to assure high conductivity.
 2. Make connections with clean bare metal at points of contact.
 3. Make copper to steel connections with stainless steel separators and mechanical clamps.

4. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
- B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except those at test wells. Provide at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations and instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.
- D. Tighten screws and bolts for grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torque requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
- E. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.
- F. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.
- G. Equipment Grounding - Wire Terminations: For No. 12 AWG and larger, use pressure-type grounding lugs; for No. 14 AWG and smaller grounding conductors, terminate with winged pressure-type connectors.

3.7 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. Test completed grounding system at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by the 2- point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System."
- B. Report measured ground resistances that exceed the following values:
 1. System with Capacity 500 kVA and Less: 10 ohms.
 2. System with Capacity 500 to 1000 kVA: 5 ohms.
 3. System with Capacity More Than 1000 kVA: 3 ohms.
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect/Engineer promptly and include recommendations to reduce ground resistance.

3.8 ADJUSTING AND CLEANING

- A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition. Include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching. Perform such Work in accordance with Division 2 Section "Landscape Work." Maintain disturbed surfaces. Restore vegetation in accordance with Section "Landscape Work." Restore disturbed paving as indicated.

END OF SECTION 26 05 26

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Summary: This Section includes the furnishing and installation of hangers and supports for electrical equipment and systems. The contractor shall design and provide supports for single and multiple raceway installations. The contractor shall also design and provide supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.2 REFERENCES

- A. UL, Building Materials Directory.
- B. Welding-Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. MFMA – 4 Metal Framing Manufacturer's Association.
- D. MSS SP-58 - Manufacturers Standardization Society of the Valve and Fittings Industry.
- E. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

1.3 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

1.4 SUBMITTALS

- 1. Not required.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION

- A. All hangers and supports for electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems, MFMA-4, with manufacturer recognized fittings and accessories. 12 gauge "U" section, 1-1/2" square nominal.

- B. Threaded rod: Zinc plated steel, 3/8" diameter minimum sized to support load with safety factor of 2.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for electrical conductors in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 1. Mechanical-Expansion Anchors: Insert-wedge-type, steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: All-steel springhead type.
 6. Hanger Rods: Threaded steel.
- H. Structural Support Systems in Corrosive Atmospheres (including but not limited to pools, pool mechanical rooms, saunas, etc): Provide corrosion proof equipment (including anchoring equipment, hardware, fittings, coverplates, etc.) for all electrical equipment located within rooms. Provide non-ferrous stainless steel 304 grade or better or aluminum equipment. Ferrous metal equipment is not allowed.

2.3 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.

2.4 CONCRETE BASES

- A. Use 4500-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 and 32 (as applicable).

PART 3: EXECUTION

3.1 GENERAL INFORMATION.

- 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.

3.2 METHODS AND LOCATIONS OF HANGERS AND SUPPORTS

- A. Ceiling support wires shall not be utilized to support power, signaling or communications raceways or cables. Independent support wires used for support can be attached to a nonfire-rated assembly. These support wires shall be distinguishable by color, tagging or similar method.
- 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. Drill holes for anchors in concrete at locations and to depths that avoid reinforcing bars.
 - 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. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
 - a. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock-washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater.
 - b. Verify with Owner the use of powder-actuated anchors.
 - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts or Beam clamps complying with MSS SP-69 or spring-tension clamps (for up to 1-1/2").
 - 6. To Light Steel: Sheet metal screws.
 - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

- A. Surface mounted cabinets and panelboards: Provide a minimum of four anchors. Provide steel channel supports to stand cabinet one inch off of wall, or on 3/4" painted (all sides) plywood backboard.
- B. Flush mounted cabinets and panelboards: Provide bridging, top and bottom, between studs in wall.
- C. Miscellaneous Equipment: Do not fasten hangers or supports to piping, ductwork, mechanical equipment, or other electrical conduit.
- D. Roof:
 - 1. Support equipment and luminaires from the top chord of bar joists. Connect at bar joist top chord panel point, junction of vertical or angular member to top chord.
 - 2. Unless otherwise noted on the plans / drawings, do not support equipment from roof deck.
 - 3. Raceway and junction box installation installed under roof decking shall be supported so that nearest outside surface of the raceway is not less than 1-1/2" from the nearest surface of the roof decking.

- E. Concrete Housekeeping Pads: Install free-standing electrical equipment on 4” pad that overlaps equipment footprint by 2” on all sides.

3.4 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "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.

3.5 INSTALLATION OF CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.6 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.
- B. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- C. Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- D. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the furnishing, installation, and connection of conduit, fittings, and boxes for a complete grounded raceway system.
 - 1. Conduits, tubing, and fittings.
 - 2. Metal wireways and auxiliary gutters.
 - 3. Interior outlets and junction boxes.
 - 4. Boxes, enclosures, and cabinets.
 - 5. Handholes and boxes for exterior underground cabling.
- B. Related Sections:
 - 1. 26 27 26 "Wiring Devices" for floor boxes, poke-throughs and multi-outlet assemblies.

1.2 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for equipment as follows:
 - 1. Handholes.
- B. Samples of any or all proposed equipment or system components shall be submitted for examination/approval as requested.
- C. Record Drawings. The Contractor shall keep layout plans on the job site, marking all changes made during installation. A set of As-Built / Record drawings shall be submitted.

1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated
 - 2. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated
 - 3. ANSI C80.5 – Aluminum Rigid Conduit
 - 4. ANSI C80.6 – Intermediate Metallic Conduit
 - 5. ANSI/NEMA FB-1 – Fittings and Supports for Conduit and Cable Assemblies
 - 6. NEMA 250 Enclosures for Electrical Equipment (1000V Maximum)
 - 7. NEMA OS 1 – Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports
 - 8. NEMA RN-1 – PVC Externally-Coated Galvanized Rigid Steel Conduit
 - 9. NEMA TC2 – Electrical Plastic Tubing and Conduit
 - 10. NEMA TC3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - 11. UL, Building Materials Directory
 - 12. UL 5 – Surface Metal Raceways and Fittings

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards. General Indoor Purpose = NEMA1, Outdoor = NEMA 3R, etc.

2.2 CONDUIT AND FITTINGS

- A. Rigid non-metallic conduit (U.L. Standard UL-651, A.N.S.I. Standard F512, NEMA Standard TC-2, Federal Specifications GSA-FSS and W-C-1094-A):
 - 1. Provide schedule 40 PVC Conduit installed in accordance with NEC Article 352 for underground and exposed use and shall be used underground in or beneath slabs on grade, in crawl spaces and tunnels, and in exterior exposed locations unless noted otherwise. Schedule 80 shall be used in bored and under roadway/parking locations or as specified herein or on the drawings. Raceway supports shall be PVC or PVC-coated.
- B. Rigid PVC coated rigid steel conduit:
 - 1. Conduit, 40mil PVC coated, shall be used for transition from underground or underfloor to exposed locations. The transition shall be made underground or underfloor to 24" AFG or AFF.
 - 2. Provide threaded type fittings, couplings, and bushings for rigid PVC coated steel conduit with the same coating as the conduit. Provide brush-on PVC touch-up compound.
- C. Flexible metallic conduit (U.L. Standard UL-1):
 - 1. Provide flexible conduit, installed in accordance with NEC Article 348, for connections to motors, transformers, other rotating or vibrating equipment, and recessed lighting fixtures, but not over 6'-0" in length unless noted otherwise.
 - 2. Provide Type U.A., hot-dip galvanized, flexible steel conduit tubing. Provide steel or malleable iron type fittings, couplings, and bushings for flexible metallic conduit. Cast type devices are not acceptable.
- D. Liquid-tight flexible metal conduit (U.L. Standard UL-360):
 - 1. Provide liquid-tight flexible conduit, installed in accordance with NEC Article 350, for connections to rotating or vibrating equipment outdoors in wet or damp locations, or in corrosive atmospheres, but not over 6'-0" in length unless noted otherwise.
 - 2. Provide Type U.A. flexible conduit covered with an extruded, polyvinyl chloride sheath. Provide steel or malleable iron, water-tight type fittings, couplings, and bushings approved for use with liquid-tight flexible metal conduit.
- E. Rigid steel conduit (U.L. Standard UL-6, A.N.S.I. C80-1, Federal Specification WW-C-581E):
 - 1. Provide rigid steel conduit as required for applications not covered above and in accordance with NEC Article 344.
 - 2. Provide hot-dip galvanized or electro-galvanized, inside and outside, rigid steel conduit having a bichromate finish. Threads shall be zinc coated. Provide threaded type fittings, couplings, and bushings for rigid steel conduit.
- F. Rigid aluminum conduit (A.N.S.I. C80.5):
 - 1. Provide rigid aluminum conduit as required for applications not covered above (A-E) and in accordance with NEC Article 344.
 - 2. Provide rigid aluminum conduit conforming to U.L. and ANSI standards. The inside shall have a wax or similar coating to facilitate pulling. Provide threaded type fittings, couplings, and bushings for rigid aluminum conduit.
- G. Intermediate metal conduit (IMC) (U.L. Standard UL-1242, Federal Specification WW-C-581E):
 - 1. Provide intermediate metal conduit as required for applications not covered above (A-E) and in accordance with NEC Article 342.
 - 2. Provide hot-dip galvanized, intermediate metal conduit. Provide threaded type, concrete-tight split couplings, concrete-tight steel compression type, or concrete-tight steel set-screw type fittings, couplings, and bushings for intermediate metal conduit. Cast type devices are not acceptable.
- H. Electrical metallic tubing (EMT) (U.L. Standard UL-797, A.N.S.I. C80-3, Federal Specification WW-C-563):
 - 1. Provide electrical metallic tubing as required for applications not covered above (A-E) and in accordance with NEC Article 358.
 - 2. Provide electro-galvanized, electrical metallic tubing. The interior shall have a smooth coating of aluminum lacquer or enamel. Tubing shall not be threaded. Provide concrete-tight steel compression or set-screw type fittings, couplings, and bushings for electrical metallic tubing. Cast or indenter type devices are not acceptable.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 (Type 3R for damp or wet locations) unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireways shall be provided without knockouts and shall have hinged type covers.
- D. Finish: Manufacturer's standard enamel finish.
- E. Provide "lay-in" type wireway with lengths and connectors hinged to provide unobstructed lay-in of conductors. All fittings must be so constructed to continue the "lay-in" feature through the entire installation.
- F. All sheet metal parts shall be provided with a rust-inhibiting phosphatizing coating and finished in baked enamel. All hardware shall be plated to prevent corrosion.
- G. All lengths, connectors and fittings shall be U.L. labeled and installed in accordance with NEC Article 366, and 376 (Auxiliary Gutters and Metallic Wireway) respectively. U.L. listing of lengths without listing connectors or fittings is not acceptable. Square D "Square-Duct", or approved equal.

2.4 INTERIOR OUTLET AND JUNCTION BOXES

- A. Outlet and junction boxes in dry interior locations shall be as follows:
 - 1. For devices recessed within a vapor barrier wall (i.e. typical exterior wall) provide vapor barrier boxes, with gasketing as required to maintain the continuous vapor barrier. Exterior surfaces of boxes shall be sealed. Secure vapor retarder to box and provide flat blocking if required. Raceways entering/leaving boxes shall be sealed.
 - 2. For other interior locations provide minimum 4" square galvanized steel box.
- B. General requirements:
 - 1. For flush installations provide appropriate tile or plaster covers.
 - 2. Boxes in walls and ceiling tiles shall be securely fastened in such a manner as not to rely on cover trim plate for support.
 - 3. Where surface mounted outside or in wet locations, boxes shall be iron alloy type, FS or FD with threaded hubs.

2.5 CABINETS

- A. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
- B. Hinged door in front cover with flush latch and concealed hinge.
- C. Key latch to match panelboards.
- D. Metal barriers to separate wiring of different systems and voltage.
- E. Accessory feet where required for freestanding equipment.

2.6 HANDHOLES AND BOXES FOR EXTERIOR AND UNDERGROUND WIRING

- A. Outdoor/Underground junction boxes or handholes shall be code sized cast iron or fiberglass reinforced concrete such as Armormat A600 Series. Hardware shall be stainless steel and covers shall be permanently imprinted "ELECTRIC."

- B. Handholes shall meet the following ANSI 77 Tier loading requirements:
1. Light Duty: Pedestrian traffic only.
 2. Tier 5: Sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic.
 3. Tier 8: Sidewalk applications with a safety factor for non-deliberate vehicular traffic.
 4. Tier 15: Driveway, parking lot and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic.
 5. Tier 22: Driveway, parking lot and off-roadway applications subject to non-deliberate heavy vehicular traffic.
 6. AASHTO H-20: Deliberate vehicular traffic applications.

PART 3: EXECUTION

3.1 GENERAL INFORMATION.

- A. Raceways and boxes shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

3.2 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit.
 2. Concealed Conduit, Aboveground: Rigid steel conduit; IMC; EMT; RNC, Type EPC-40-PVC.
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
 5. Underground Conduit:
 - a. Under driveways, roadways, parking lots, etc: RNC, Type EPC- 80-PVC, direct buried.
 - b. All other underground applications: RNC, Type EPC- 40-PVC, direct buried.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Finished Areas:
 - a. New construction: Concealed unless indicated otherwise.
 - b. Existing areas: Conceal in wall using flex conduit unless surface mounting is indicated. Where surface mounting is allowed, use conduit.
 2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 3. Exposed, Not Subject to Physical Damage: EMT.
 4. Exposed, Not Subject to Severe Physical Damage: EMT.
 5. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Areas used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. In parking garages or other vehicular areas below 7'-0".
 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 7. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment):
 - a. LFMC in damp or wet locations.
 - b. FMC in other areas.
 8. Damp or Wet Locations: Rigid steel conduit or IMC in other areas.
 9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
 10. Underslab Conduits:
 - a. Feeders are allowed to be routed under slab. Coordinate routing with other trades. Document routing on as-builts.
 - b. Branch circuits and home runs are not allowed to be routed underslab except where conditions prohibit overhead routing (to floor boxes, island cabinetry, partial height walls, etc).

3.3 INSTALLATION OF CONDUIT

- A. Installation shall be in accordance with the NEC and as shown on the drawings. Flattened, dented, deformed, or opened conduit is not permitted. If damaged during installation, damaged conduit shall be replaced with new undamaged material. Prevent foreign matter from entering raceways by using temporary closure protection. Test conduits with ball mandrel. Clear any conduit which rejects the ball and mandrel.
- B. Minimum size homerun to panels and cabinets is 3/4 inch. From all flush panelboards, terminal cabinets, and control panels, stub three empty 3/4" conduits up and down into the suspended ceiling spaces. In areas without ceilings, stub out near the underside of adjacent floor slabs.
- C. Minimum size conduit for mechanical equipment and architectural motors is 3/4" unless specifically noted otherwise on plans or schedules.
- D. Maintain separate raceway for 480/277V and 208/120V cabling.
- E. General Installation:
 - 1. Conceal raceways within finished walls, ceilings, and floors, unless otherwise noted.
 - 2. Assure that conduit installation does not encroach into the ceiling height headroom, walkways, or doorways. Align and run conduit parallel or perpendicular to the building lines and or adjacent piping. Install horizontal runs close to the ceiling or beams, and secure with conduit straps. Independently support all conduits. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts).
 - 3. Complete raceways installation before starting conductor installation.
 - 4. Support all trapezes and all above ground feeder conduits from the building structure. Parallel runs of six (6) or more conduits shall be supported from the building structure. Do not support conduit with wire, nylon ties, nor perforated pipe straps. Remove wire used for temporary supports. Do not attach conduit to ceiling support wires. Do not support raceways from mechanical ductwork or equipment, except where required to connect to the equipment.
 - 5. Run all conduit in areas with unfinished ceilings above bottom chord of joists.
 - 6. Do not run conduits in columns except to feed column mounted devices.
 - 7. Place conduits at least 12" away from all hot piping and surfaces including domestic hot water lines. Do not mount conduit on mechanical equipment except where necessary to connect electrical devices mounted on the equipment. Provide 18" of flexible conduit in all runs "bridging" vibration mountings.
 - 8. Do not run conduit on or directly in front of access doors, removable panels, equipment removal spaces, control devices or other spaces necessary for normal maintenance and repair of the equipment.
 - 9. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system. Cap or plug conduit ends during construction. Cap or plug ends of conduits that are to remain empty and make watertight. Clean and swab conduits prior to pulling in conductors.
 - 10. Uncoated metal conduits installed underground shall be protected by two coats of bituminous paint (Koppers Bitumastic #50 or equal) or by vinyl tape (3M Scotchrap #43 or equal).
 - 11. Seal all conduits penetrations of smoke or fire rated walls or floors with intumescent type fire barriers, 3M or equal. Seal all conduits where they pass through exterior walls and where they enter exterior fixtures. Seal all conduits where temperature differential between adjacent spaces is greater than 30 degrees Fahrenheit. Seal all conduits penetrating walls built to deck.
 - 12. Conduits shall be provided with expansion or expansion/deflection fittings where traversing building or structure joints. Additionally, straight exposed conduit runs in or on buildings or structures shall be provided with expansion fittings at 100' intervals. When in concrete slab on grade, provide expansion fittings at slab expansion joints.
 - 13. Provide a dedicated conduit and feeder conductors for each motor unit on the load side of each VFD feeding the motor.
 - 14. Raceways embedded in slabs: Install in middle third of the slab thickness where practical and leave at least 1 inch (25 mm) concrete cover. Tie raceways to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Space raceways laterally to prevent voids in the concrete. Run conduit larger than 1-inch (25 mm) trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab. Where nonmetallic conduit is used, raceways must be converted to rigid steel conduit or IMC before rising above floor.

- F. Raceways for Optical Fiber and Communications Cable: Install ferrous raceways, metallic, rigid or flexible, as follows:
 - 1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
 - 2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
 - 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements. Provide brushed ends.
- G. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures, (between junction box at ceiling and each light fixtures, daisy-chaining fixtures is not accepted) equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations, even if not subject to severe physical damage.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
 - 2. Install backfill as specified in Division 31 Section "Earth Moving."
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 - 4. Unless otherwise noted on the plans / drawings, in underground conduit runs longer than 150' or in conduits runs containing #6awg or larger, install PVC 80 conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

3.5 PENETRATIONS

- A. Refer to specification 26 05 00 "Common Work Results for Electrical" for requirements related to penetrations, sleeves, sleeve seals and firestopping.
- B. Roof Penetrations: Conduit penetrations directly through roof membrane are prohibited. Route conduits through equipment curb or provide roof penetration assembly per architectural details.
- C. Where raceways penetrate building envelopes: Flex shall not be used to penetrate vapor retarder. Seal joints (connectors and couplings) of raceway with vapor retarding tape, paint-on sealer, putty pads or other approved means. Provide solid blocking installed flat at all vapor retarder penetrations. Secure vapor retarder to blocking.

3.6 SURFACE RACEWAY

- A. The raceway shall be securely supported at intervals in accordance with manufacturer's installation sheets. All raceway systems shall be installed complete, including insulating bushings and inserts where required by manufacturer's installation sheets. Coordinate installation with General Contractor where raceway is installed in or above casework.
- B. Provide a separate ground conductor in each section of raceway and bond to supply conduit system in an approved manner.

3.7 WIREWAY

- A. Installation shall be in accordance with the NEC Article 376, 378, and 366, respectively, and as shown on the drawings. Manufacturer's suggested insulating bushings and inserts at connections to outlets and corner fittings shall be used, as required.

3.8 INSTALLATION OF OUTLET BOXES

- A. Installation shall be in accordance with the NEC Article 314 and as shown on schedules on the drawings.
 - 1. Interior outlet junction boxes in the same wall mounted back-to-back are prohibited. Junction boxes shall be securely mounted and arranged so that the boxes are square with the building surfaces.
 - 2. Wall outlet boxes shall be plumb and accurately aligned in rows. Mount ceiling boxes symmetrical with walls, beams and/or tiles.
 - 3. Mount outlet boxes in exposed masonry walls with the top or bottom of the box aligned with mortar joints, but not less than 15" A.F.F.
 - 4. Provide center mounted fixture studs in boxes for direct fixture mounting. Provide special fixture hangers and/or auxiliary supports where the weight of the fixture requires more support than the fixture stud.
 - 5. Where the weight of the devices and/or use of the finished outlet assembly requires additional support in ceiling tile installations, provide special hangers and/or auxiliary supports.
 - 6. Thru-wall boxes shall not be used unless specifically noted.
 - 7. Close openings in all outlet boxes during plaster and concrete work with plain paper or slip on plastic or metal plates. Do not use newspaper.
 - 8. Provide pull boxes fabricated of code gauge, galvanized sheet steel with screw covers held in place by corrosion resistant screws, and located to be accessible when the building is finished. Do not locate pull boxes in finished spaces without the specific approval of the Engineer/Architect. Equip boxes requiring 4 1/2" square or smaller covers with blank covers to match switch plates. Paint 5" square or larger steel pull box covers to match electrical panel fronts.
 - 9. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
 - 10. Set metal floor boxes level and flush with finished floor surface.
 - 11. Recess all device boxes in finished floors, ceilings, and walls unless otherwise indicated.

3.9 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below the frost line..
- E. The tops of flush mounted ground boxes outdoor / underground shall be set at finished grade. After inspection and approval by the Engineer, fill with a re-enterable non-hygroscopic material such as Dri-Therm (Tel. 800-343-4188) powder and securely install covers.

3.10 PROTECTION / CLEANING

- A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.
- B. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion. Remove all construction debris.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the furnishing and installation of identification of electrical equipment as specified and indicated on the drawings.

1.2 SUBMITTALS

- A. Samples of each type of proposed label and/or signs shall be submitted for examination/approval as requested.
- B. Record Drawings. The Contractor shall keep layout plans on the job site, marking all changes made during installation. A set of As-Built / Record drawings shall be submitted.

1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 1. ANSI A13.1 – Pipe Identification Standard.
 2. 29 CFR 1910.145 – Accident Prevention Tags.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.2 IDENTIFICATION LABELS / NAMEPLATES

- A. Provide equipment identification labels per labels identified on drawings. Nameplates: Engraved three-layer laminated plastic with white melamine core and black melamine surface:
 1. Engrave characters with a minimum height of 1/4".
 2. Punched or drilled for screw mounting.
 3. Provide white letters on a black background for equipment on normal utility power system.
 4. Provide white letters on a red background for equipment on emergency or standby power system.
- B. Concealed Indelible ink ('Sharpie') / Adhesive Marking Labels for Raceways and Cable: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Lighting, Power, Communications, Control, Fire Alarm). Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
 1. Label Size:
 - a. Raceways 1-Inch and Smaller: 1-1/8 inches high by 4 inches long.
 - b. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long.
 2. Color: Black legend on orange background.

3. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- C. Pre-tensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the raceway or cable.

2.3 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

- A. Provide communication and control-cable identification with one of the following methods:
1. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
 2. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
 3. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.
 4. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), 19 gauge, with stamped legend, punched for use with self-locking nylon tie fastener.
 5. Where exposed to damage or rough service provide one of the following two methods.
 - a. Write-On Tags: Polyester tag, .015" thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.
 - b. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.
1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous metallic strip or core.
 4. Printed legend shall indicate type of underground line.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/8-inch minimum thick. Engraved legend in white letters on black face and punched for mechanical fasteners.
- C. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

2.6 INSTRUCTION SIGNS

- A. Provide instructions signs as indicated on drawings:
 - 1. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 2. Engraved legend with black letters on white face.
 - 3. Punched or drilled for mechanical fasteners.
 - 4. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength: 50 lb (22.6 kg), minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. Panelboard and relay schedules shall be typed and dated on card stock.

PART 3: EXECUTION

3.1 GENERAL INFORMATION.

- A. Identification means shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

3.2 COORDINATION.

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

3.3 INSTALLATION OF IDENTIFICATION / LABEL NAMEPLATES

- A. Degrease and clean surfaces to receive nameplates. Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to dead-front barrier recessed panelboards in finished locations. Embossed tape will not be permitted for any application.

- B. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation, Maintenance and Warranty Data Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 2. Nameplate Engraving
 - a. Provide nameplates to identify all electrical distribution and control equipment, and loads served.
 - b. Letter Height: 1/8 inch for individual switches and loads served, 1/4 inch for distribution and control equipment identification.
 - c. Switchboards, panelboards, nameplates shall include: equipment name, the equipment name where the source originates, and equipment voltage.
 3. Box Identification:
 - a. Label box cover with the panelboard(s) name and circuit numbers contained within. Use marking pen to label all feeder junction and pull boxes; communications systems junction and pull boxes; all junction boxes, pull boxes, and raceways installed for future use.
 - b. Paint covers of systems' junction boxes with assigned paint color and label with marking pen.
 4. Equipment Identification:
 - a. Provide plastic laminated "NAME PLATES" as indicated or required in individual specification sections.
 - b. Install name plates inside covers in finished areas using approved contact cement.
 - c. Install name plates outside covers in unfinished areas using approved contact cement, self-tapping screws, or rivets.
 - d. Provide engraved cover plates where indicated on the Drawings.
 5. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
 6. Device Labeling:
 - a. Identify panelboard and circuit number from which served. Use permanent ink marker to label inside of box, and provide permanent adhesive labels (clear tape with black lettering) on front of coverplate. Install label on interior of device coverplate for weatherproof locations.

3.4 INSTALLATION OF CABLE OR CONDUCTOR IDENTIFICATION / LABEL

A. Wire Identification:

1. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.
2. Power-Circuit Feeder Conductor Identification: Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
3. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, Identify each ungrounded conductor according to source and circuit number.
4. Conductors to Be Extended in the Future: Attach label to conductors and list source and circuit number.
5. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections with source and circuit/zone number.
6. Match identification markings with designations used in panelboard / control panel shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

3.5 INSTALLATION OF UNDERGROUND-LINE WARNING TAPE

- #### **A. Locations of Underground Lines:** Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. During backfilling of trenches, install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- #### **B. Raceways and Duct Banks More Than 600 V Concealed within Buildings:** 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- #### **C. Accessible Raceways More Than 600 V:** Identify with "DANGER-HIGH VOLTAGE" in black letters at least 2 inches (50 mm) high, with snap-around labels. Repeat legend at 25-foot maximum intervals.

3.6 INSTALLATION OF WARNING LABELS AND SIGNS AND INSTRUCTIONS

A. Provide warning, caution, or instruction label and signs and /or stencils as follows:

1. Install warning, caution, or instructions signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

3.7 IDENTIFICATION SCHEME

A. Verify system identification scheme / color coding with owner. If identification scheme is not defined the following color code shall be used:

1. Fire Alarm System: Red.
2. Electrical Distribution System: Silver (unpainted).
3. Security System: Purple.
4. Telecommunication System: Blue.

3.8 EQUIPMENT LABELS:

A. Equipment to Be Labeled:

1. Panelboards, relay panels, electrical cabinets, and enclosures.
2. Access doors and panels for concealed electrical items.
3. Electrical switchgear and switchboards.
4. Transformers.
5. Disconnect switches.
6. Enclosed circuit breakers.
7. Motor starters.
8. Push-button stations / HVAC equipment control stations.
9. Power transfer equipment.
10. Contactors.
11. Remote-controlled switches, dimmer modules, and control devices.
12. Power-generating units.
13. Monitoring and control equipment.

END OF SECTION 26 05 53

SECTION 26 09 23

LIGHTING CONTROL DEVICES

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the furnishing and installing of all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes, and equipment necessary for and incidental to the delivery, installation, and furnishing of lighting control devices as described herein. Unidentified devices shall be the same types as those provided in similar areas.

1.2 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for all lighting control devices as follows:
 - 1. Line-voltage light switches.
- B. While “typical” connections and circuits are of interest, complete system Shop Drawings shall be prepared for this particular project that include device layout, orientation, point-to-point wiring diagram(s), and conductor sizes and types.
 - 1. Submit any interconnection diagrams to the lighting control panel showing proper wiring.
 - 2. Submit lighting plan showing location, orientation, and coverage area of each sensor.
- C. Samples of any or all proposed equipment or system components shall be submitted for examination/approval as requested.
- D. Record Drawings. The Contractor shall keep layout plans on the job site, marking all changes made during installation. A set of As-Built / Record drawings shall be submitted.
- E. Final Documentation. Submit all operation, maintenance and warranty data manuals showing test results.

1.3 QUALITY ASSURANCE.

- A. The equipment manufacturer shall be regularly engaged in manufacture of lighting control devices, of the types and capacities required, and whose products have been in satisfactory use in similar service for not less than ten years.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory’s label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.2 LINE VOLTAGE LIGHT SWITCHES

- A. Comply with NEMA WD 1 and UL 20.

- B. Industrial Grade Toggle Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - b. Hubbell; 1221 (single pole), 1222 (two pole), 1223 (three way), 1224 (four way).
 - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - d. Pass & Seymour; Spec grade 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
 - e. See plan for keyed switch, pilot options.
- C. Refer to drawings for key-switches when required.
- D. Refer to 26 27 26 Wiring Devices for device finish information.

2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3: EXECUTION

3.1 GENERAL INFORMATION.

- A. Lighting control devices shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. System Installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of work. All wiring and devices shall be installed in accordance with manufacturer's and UL recommendations. Class II low-voltage occupancy sensor wiring in exposed areas shall be installed in metallic raceway. Class II low-voltage occupancy sensor wiring in concealed accessible areas that is not installed in conduit shall be plenum rated. All system junction boxes must be clearly marked for easy identification.
- C. Wiring splices shall be avoided and, if needed, must be made only in junction boxes. All conductors shall be labeled on each end with "E-Z markers," or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite its terminal. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on the equipment panel.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).
 - 1. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
 - 2. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
 - 3. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
 - 3. Label time-switches and contactors with a unique designation.

3.4 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including luminaires, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

3.5 FIELD QUALITY CONTROL

- A. Field Wiring shall be checked and tested to ensure that there are no grounds, opens, or shorts. The minimum allowable resistance between any two conductors or between conductors and ground is 10 megohms after all conduit and conductors have been installed, but before the sensors are connected. Perform walk tests and set-up procedures for each sensor as specified by the manufacturer to ensure that all boundaries of coverage are sufficient.

3.6 WARRANTY

- A. The Contractor shall provide parts and labor warranty for the completed occupancy sensor system wiring, equipment, and software to be free from inherent mechanical and electrical defects for a period of one year from the date of completion and acceptance as issued by the Architect's certificate of completion. The individual sensors shall have a five year warranty.

3.7 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for any lighting control systems specified elsewhere in Division 26 Sections.

3.8 RECORD DRAWING DOCUMENTATION

- A. After successful completion of all the tests and adjustments listed above, the Contractor shall submit the following information to the Engineer in the Operation, Maintenance and Warranty Data Manuals:
 - 1. Complete As-Built Wiring Diagrams.
 - 2. System Operating Manuals.
 - 3. Copy of the Test Report, as detailed above.

END OF SECTION 26 09 23

SECTION 26 27 01

ELECTRICAL UTILITY COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes underground electrical service requirements that will be installed to serve the facility.
- B. Related Sections include the following:
 - 1. Division 26 Section "26 05 00" – General Requirements
 - 2. Division 26 Section "26 05 19" – Electrical Power Conductors
 - 3. Division 26 Section "26 05 26" – Grounding and Bonding
 - 4. Division 26 Section "26 05 33" – Raceways & Boxes for Electrical Systems

1.02 SUBMITTALS

- A. Product Data: For the following:
 - 1. Combination Meter Socket and Service Disconnect

1.03 COORDINATION

- A. Coordinate location of electrical service with the drawings, Engineer, Architect and Utility Company.
- B. Coordinate exact dimensions and construction requirements with the local utility.
- C. Coordinate minimum clearance requirements with the local utility.
- D. The service connections shall be installed in strict accordance with the rules of the power company.

PART 2 PRODUCTS

2.01 CURRENT TRANSFORMER / METERING CABINET

- A. Acceptable Manufacturers:
 - 1. States Electric
 - 2. AMP
 - 3. EMI
 - 4. Square D
 - 5. Or Approved Equals
- B. Provide a meter cabinet as required by the Power Company.
- C. Meter cabinet shall be weatherproof / rustproof with lockable removable access cover.
- D. Provide a raceway as required between the meter cabinet and transformer.
- E. Provide raceways and connections from the meter cabinet to the panelboard.
- F. Locate utility metering and current transformers in the cabinet. Coordinate with the utility.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The service connections shall be installed in strict accordance with the rules of the Utility. Initiate and take responsible charge for all negotiations with the Utility with regard to the service connections, and initiate the necessary requests to the Utility for the work which will be performed by them.
- B. The underground electrical service shall be installed from the local utility service to the building service entrance equipment. The equipment shall be provided and installed by the Power Company (Utility) or Electrical Contractor (Contractor) as scheduled below. Verify all responsibilities with Utility prior to bid.

| | Furnished By | Installed By |
|---|--------------|--------------|
| 1. Site Restoration | Contractor | Contractor |
| 2. Secondary Connections @ Transformer | Contractor | Contractor |
| 3. Secondary Service Trenching | Contractor | Contractor |
| 4. Secondary Electrical Conductors | Contractor | Contractor |
| 5. Secondary Raceways | Contractor | Contractor |
| 6. Electrical Meter(s) | Utility | Utility |
| 7. Electrical Meter Socket | Contractor | Contractor |
| 8. Current Transformers (utility meter) | Utility | Contractor |
| 9. Metering Conductor Raceway | Contractor | Contractor |
| 10. Metering Conductors | Contractor | Contractor |
| 11. Raceway from CC to Transformer | Contractor | Contractor |

3.02 SERVICE CHARGES

- A. Fees and charges submitted by the Utility for the work associated with new or relocated metering for this project shall be responsibility of Contractor. All other fees shall be borne by the Owner.
- B. Electrical contractor shall coordinate exact requirements with the utility. No extra charges will be allowed because of the failure of the contractor to contact the Utility and determine what will be required to complete the service installation.
- C. Charges (the electric bill) for power consumed during the construction of this project will be borne by the Owner.

3.03 GROUNDING

- A. Provide grounding as required by the Utility, National Electrical Code.
- B. Ground equipment according to Division 26 05 26 Section "Grounding and Bonding."

END OF SECTION 26 27 01

SECTION 26 27 26

WIRING DEVICES

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the furnishing and installation of all labor, materials, hardware, and ancillary equipment for and incidental to the delivery, installation, and connection of wiring devices as described herein.

1.2 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for all wiring devices as follows:
 - 1. Receptacles.
 - 2. Twist-locking receptacles.
 - 3. Wall plates and finishes.
- B. Samples of any or all proposed equipment or system components, in each color specified, shall be submitted for examination/approval as requested.
- C. As-Built Drawings: Plans indicating conduit routing for floor-box and poke-throughs.
- D. Operation, Maintenance and Warranty Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.3 QUALITY ASSURANCE

- A. The equipment manufacturer shall be regularly engaged in manufacture of wiring devices, of the types and capacities required, and whose products have been in satisfactory use in similar service for not less than ten years.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

1.4 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. FS W-C-596 – Electrical Power Connector, Plug, Receptacle, and Cable Outlet.
 - 2. NEMA WD 1 – General-Purpose Wiring Devices.
 - 3. NEMA WD 5 – Specific-Purpose Wiring Devices.
 - 4. UL 498 – Attachment Plugs and Receptacles.
 - 5. UL 943 – Class A Ground-Fault Circuit-Interrupters.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

- B. Provide new wiring devices at each outlet / opening indicated on the drawings. Devices shall be UL listed, and installed in accordance with NEC Article 404 and 406. Unless otherwise noted, all devices shall be industrial specification grade and of one manufacturer.

2.2 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.3 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5361 (single), 5362 (duplex).
 - b. Hubbell; HBL5361 (single), 5362 (duplex).
 - c. Leviton; 5361 (single), 5362 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362 (duplex).
 - e. See plan for GFCI requirement. Add GF to 5362. Provide blank face GFCI test devices where indicated.
 - f. See plan for IG, Isolated Ground requirement. Add IG to 5362.
 - g. See plan for Weather Resistant or Tamper Resistant requirements.
 - 2. Description: Straight blade and with one-piece brass ground, wide bodied.
 - 3. All receptacles shall be 20A rated unless noted otherwise.
 - 4. All devices in damper or wet locations shall be of the weather-resistant type.
 - 5. Devices shall have external screw pressure plate back wired clamps.

2.4 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; L520R.
 - b. Hubbell; HBL2310.
 - c. Leviton; 2310.
 - d. Pass & Seymour; L520-R.

2.5 WALL PLATES AND FINISHES

- A. Finishes:
 - 1. Color: Wiring device catalog numbers in Section Text do not designate device color. Verify color with Drawings and Architect.
 - a. Devices: Grey.

B. Wall Plates:

1. Single and combination types to match corresponding wiring devices.
 - a. Plate-Securing Screws:
 - 1) Metal with head color to match plate finish.
 - b. Material for Finished Spaces:
 - 1) 0.035-inch-thick, satin-finished type 302 non-magnetic stainless steel.
 - c. Material for Unfinished Spaces: Galvanized steel.
 - d. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."
2. Wet-Location, Weatherproof Cover Plates: NEMA 250, gasketed, complying with type 3R weather-resistant impact resistant polycarbonate with stainless steel mounting screws.

PART 3: EXECUTION

3.01 GENERAL INSTALLATION

- A. Wiring Devices shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

3.02 INSTALLATION OF WIRING DEVICES

- A. Install devices in accordance with the NEC and as specified. The ground terminal of each device shall be bonded to the outlet box with an approved green bonding jumper, and connected to the green equipment grounding conductor.
- B. See Drawings for mounting height of devices. If not noted, mounting heights and installation locations shall comply with NECA 1 and ADA. Mount devices shown in new locations at the indicated approximate heights to the centerline of the device. Specified heights may be adjusted + or - 2 " to meet masonry coursing; however, all similar devices shall be mounted at the same height. The Contractor is cautioned that in many cases obstructions occur either above or below the outlet and the drawings must be carefully checked for interference prior to adjusting any outlet height.
- C. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- D. Conductors:
1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.

- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

E. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails.
5. When there is a choice, use pressure plate termination.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

F. GFCI Installation:

1. Where GFCI devices are located in inaccessible locations (vending machines, kitchen equipment, etc) provide and label remote test stations at a location agreed upon by Owner and Electrical Inspector.

G. Floor Box and Poke-Through Installation:

1. Floor boxes and poke-throughs shall be determined from dimensioned plans as directed by Architect. Contractor shall request dimensioned plans in a timely manner from Architect.
2. For poke-throughs with penetrations into inaccessible ceilings route conduits to nearest accessible space. Label conduits and include in as-built drawings.
3. Install with bead of silicon caulk to prevent water leakage.

H. Device Plates:

1. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
2. Provide blank coverplates over all unused Div 26, 27 and 28 openings.

3.03 IDENTIFICATION

- A. Comply with device labeling requirements found in Division 26 Section "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436, Outlet Circuit Testers and Similar Indicating Devices.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

- B. Tests for Convenience Receptacles:

1. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943, Ground Fault Circuit Interrupters.
2. Using the test plug, verify that the device is wired properly.

3.05 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

END OF SECTION 26 27 26

SECTION 26 28 13

FUSES

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.
2. Extra materials.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.03 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
4. Coordination charts and tables and related data.
5. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Submit record of transmittal as part of O&M Manual. Refer to "Extra Materials" article in Part 2 below.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.05 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.06 COORDINATION

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

PART 2: PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Littelfuse, Inc.
 - 4. Mersen, Inc.

2.02 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.03 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 5 percent of quantity installed for each size and type, but no fewer than two of each size and type.

PART 3: EXECUTION

3.01 EXAMINATION

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

3.02 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, time delay.
2. Feeders: Class RK1, time delay.
3. Motor Branch Circuits:
 - a. Motors with Variable Frequency Drives: Type JJC, Class T.
 - b. All other Motors: Class RK5, time delay.
4. Other Branch Circuits: Class RK5, time delay.
5. Control Circuits: Class CC, time delay.

3.03 INSTALLATION

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

3.04 IDENTIFICATION

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

END OF SECTION 26 28 13

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1: GENERAL

1.01 SCOPE

- A. This Section includes the furnishing and installation of all labor, materials, tools, appliances, hardware, junction boxes, and ancillary equipment for and incidental to the delivery, installation, and furnishing of completely operational enclosed switches and circuit breakers as shown, required, and specified herein.

1.02 SUBMITTALS

- A. Shop Drawings shall be submitted for approval for all enclosed switches and circuit breakers as follows:
1. Fusible switches.
 2. Non-fusible switches.
 3. Shunt trip switches.
 4. Molded-case circuit breakers (MCCBs).
 5. Molded-case switches.
 6. Enclosures.
- B. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, details, wiring diagrams, attachments to other work, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
1. Enclosure types and details for types other than NEMA 250, Type 1.
 2. Current and voltage ratings.
 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
- C. 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.

1.03 CLOSEOUT SUBMITTALS

- A. Operation, Maintenance and Warranty Data: For enclosed switches and circuit breakers to include in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation, Maintenance and Warranty Data," include the following:
1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 2. Test Data: Results of thermal scan tests.
 3. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.04 QUALITY ASSURANCE

- A. Manufacturer of enclosed switches and circuit breakers shall be specialized in the manufacture and assembly of such equipment for a minimum of 25 years.

- B. Equipment shall be listed and/or classified by Underwriters Laboratories and in accordance with standards listed in this Specification.
- C. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
- D. Source Limitations: Obtain enclosed switches and circuit breakers from single source from single manufacturer.

1.05 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. NEMA AB 1 – Molded Case Circuit Breakers.
 - 2. NEMA KS 1 – Enclosed Switches.
 - 3. NEMA PB 1 – Panelboards.
 - 4. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600V or Less.
 - 5. UL 489 – Molded Case Circuit Breakers.
 - 6. NFPA 70E – Standard for Electrical Safety in the Workplace.
 - 7. NFPA 70 – National Electrical Code

1.06 MAINTENANCE

- A. Manufacturer of enclosed switches and circuit breakers shall:
 - 1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
 - 2. Make new replacement parts available for minimum of ten years from date of manufacture.
 - 3. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
 - 4. Provide on-site service support within 24 hours anywhere in continental United States.
 - 5. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

1.07 WARRANTY

- A. The Contractor shall provide a one-year warranty of the installed system against defects in material and workmanship. All labor and materials shall be provided at no expense to the Owner. Warranty period shall begin on the date of acceptance as issued by the Architect's certificate of completion.

PART 2: PRODUCTS

2.01 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.02 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide enclosed switches by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.
 - 5. Square D; a brand of Schneider Electric.

2.03 FUSIBLE / NON FUSIBLE SWITCH CONSTRUCTION AND RATINGS

- A. See drawings for number of poles, number of throw, voltage, current, AIC ratings, mounting, nameplates, environmental conditions, etc.
- B. General Fusible Switch Construction shall be:
 - 1. Type HD, Heavy Duty, Single Throw, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
 - 3. Class R Fuse Kit (if fusible): Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Auxiliary Contact Kit (where indicated): One NO/NC (Form "C") auxiliary contact, arranged to activate before switch blades open.

2.04 MOLDED-CASE CIRCUIT BREAKERS

- A. See drawings for number of poles, voltage, current, AIC ratings, GFI or GFP, mounting, nameplates, environmental conditions, etc.
- B. General Molded-Case Circuit Breaker Construction shall be:
 - 1. Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
 - a. 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 (where indicated): Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic Trip Circuit Breakers (where indicated): Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- C. Features and Accessories:
 - 1. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
 - 2. For breaker frame sizes 1200A and larger provide arc reduction maintenance switch function to meet NEC 240.87.
 - 3. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
 - 4. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.

5. Auxiliary Contact Kit (where indicated): One NO/NC (Form "C") auxiliary contact, arranged to activate before switch blades open.

2.05 MOLDED-CASE SWITCHES

- A. See drawings for number of poles, voltage, AIC ratings, mounting, nameplates, environmental conditions, etc.
- B. General Molded-Case Switch Construction shall be:
 1. Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
 2. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Features and Accessories:
 1. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
 2. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
 3. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
 4. Auxiliary Contact Kit (where indicated): One NO/NC (Form "C") auxiliary contact, arranged to activate before switch blades open.

2.06 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Kitchen, Wash-Down Areas: NEMA 250, Type 4X, Stainless Steel.
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 9 (or as required by construction or indicated on drawings).

PART 3: EXECUTION

3.01 GENERAL INSTALLATION

- A. Enclosed switches and circuit breakers shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.

3.02 EXAMINATION / COORDINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each enclosed switch / circuit breaker.

- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where enclosed switch / circuit breaker will be installed. Coordinate installation of wall-mounting and structure-hanging supports with actual enclosure provided. Coordinate layout and installation of enclosed switch / circuit breaker with other construction including conduit, piping, equipment, and adjacent surfaces.
- D. Verify that ground connections are in place and requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met.

3.03 APPLICATIONS

- A. Select features of each enclosed switch / circuit breaker to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, controller, and load; and configuration of pilot device and control circuit affecting controller functions.
- B. Select horsepower rating of controllers to suit motor controlled.

3.04 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.05 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.06 ADJUSTING AND CLEANING

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

- B. Upon completion of installation of panelboard, inspect interiors of enclosed switch / circuit breaker; clear all blockages and remove burrs, paint splatters and other spots, dirt, and construction debris. Touch up scratches and mars of finish to match original finish.
- C. Adjust Circuit Breaker trip and time-delay settings to values as instructed by the Architect/Engineer.

END OF SECTION 26 28 16

SECTION 26 32 13

ENGINE GENERATORS

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the installation of an Owner-furnished electric generating set of the type and operating characteristics described hereinafter, completely installed, tested, and operative. All necessary equipment, labor, and materials shall be included. Contractor shall provide the required permits, generator modeling, and associated costs to install the new generator. The Registration Permit will require Dispersion Modeling using the EPA SCREEN 3 model. This Section includes installation of a packaged engine-generator set for a Level 2 emergency power supply system.
- C. Concrete Bases:
1. Equipment Mounting: Install generator on concrete base. Comply with requirements for concrete base specified in Division 03 Section. Concrete shall be 4,500 minimum PSI with synthetic microfiber reinforcement.
 - a. Coordinate size of equipment bases with actual unit sizes provided. Fabricate base 4 inches larger in both directions than the overall dimensions of the supported unit. Chamfer top edge and corners of pad.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to generator.

1.2 SUBMITTALS

- A. Source quality-control test reports.
1. Certified summary of prototype-unit test report.
 2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
 3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
 4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements
 5. Report of sound generation.
 6. Report of exhaust emissions showing compliance with applicable regulations.
 7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.
 8. Field Quality C
 9. Field quality-control test reports.
- B. Operation, Maintenance, and Warranty Data: For packaged engine generator to include in emergency, operation, maintenance, and warranty data manuals. In addition to items specified in Division 01 Section "Operation, Maintenance, and Warranty Data," include the following:
1. 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.

1.3 QUALITY ASSURANCE

A. Installer Qualifications:

1. An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
3. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
4. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Comply with NFPA 37 and 70.

C. Comply with NFPA 110 requirements for Level 2 emergency power supply system.

D. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

F. Comply with UL2200.

1.4 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: -20F to 100F.
2. Altitude: Sea level to 1000 feet (300 m).
3. Do not deliver or install interior engine-generator sets until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above engine-generators is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving engine-generators into place.

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 Architect, Construction Manager, and Owner no fewer than two weeks in advance of proposed interruption of service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without written permission from Architect, Construction Manager and Owner.
4. Comply with NFPA 70E.

1.5 REFERENCES

A. The products provided by this section shall comply with the following applicable references (latest edition):

1. ASME B15.1 – Safety Standard for Mechanical Power Transmission.
2. NFPA 37 – Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.

3. NFPA 110 – Standard for Emergency and Standby Power Systems.
4. UL 2200 – Stationary Engine Generator Assemblies

1.6 COORDINATION

- A. Coordinate size and location of concrete bases for package engine generators. Provide base thickness and size as recommended by generator supplier as a minimum or as indicated. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03. Coordinate layout and installation of generator with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. Generator to be furnished by Owner and turned over to contractor for installation. Provide all necessary equipment and material for complete and working installation.
- B. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

PART 3: EXECUTION

3.1 GENERAL INSTALLATION

- A. Engine generators shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.

3.2 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Install packaged engine generator with elastomeric isolator pads having a minimum deflection of 1 inch on 4-inch- (100-mm-) high concrete base. Secure sets to anchor bolts installed in concrete bases. Verify and provide structural support bars, and thickness and size of concrete base required by manufacturer of genset.

- D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall or ceiling. Size exhaust vent per manufacturer's instructions. Provide flexible connectors and steel piping materials and installation requirements to meet as specified in Division 23 Section "Hydronic Piping."
 - 1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints.
- E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Provide all interconnection and control wiring in conduit between genset and all automatic transfer switches and remote alarm, control and/or monitoring and annunciator panels. Verify wire quantities and types with manufacturer(s) of alarm or monitoring panels.
- F. Connect generator dampers, fuel pump motors and associated electrically operated items on emergency power circuits where required for generator operation.
- G. Provide full tank of fuel after testing is complete.

3.4 CONNECTIONS

- A. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- B. Connect engine exhaust pipe to engine with flexible connector.
- C. Connect louver to generator exhaust with ducting.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.5 IDENTIFICATION

- A. Identify system components according to Division 26 Section "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
 - a. Testing shall include demonstration of all operational requirements, including open and closed transition switching as applicable at light (quarter-load), medium (half-load) and full load. Testing shall also include four consecutive hours of operation at full load.
 - 3. 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. Verify acceptance of charge for each element of the battery after discharge.
 - c. Verify that measurements are within manufacturer's specifications.
4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 6. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 7. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 8. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line.
- C. Coordinate tests with tests with transfer switches and run them concurrently.
 - D. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
 - E. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
 - I. 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.
 - J. Include all testing reports in Operation, Maintenance, and Warranty Data Manual(s).

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Provide video taping of this session. Refer to Division 01 Section "Demonstration and Training." Provide an 8 hour training session for Owner personnel.

END OF SECTION 26 32 13

SECTION 26 36 00

TRANSFER SWITCHES

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the installation of an Owner-furnished automatic transfer switch(es) of the type and operating characteristics described hereinafter, completely installed, tested, and operative. All necessary equipment, labor, and materials shall be included.

1.2 SUBMITTALS

- A. Field quality-control test reports.
- B. Operation, Maintenance, and Warranty Data: For each type of product to include in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation, Maintenance, and Warranty Data," include the following:
 - 1. Features and operating sequences, both automatic and manual.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
 - 2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 - 3. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

1.4 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. NEMA ICS1 – Industrial Control and Systems.
 - 2. NEMA ICB-10-1993.
 - 3. NFPA 110 – Standard for Emergency and Standby Power Systems.
 - 4. UL 1008 – Transfer Switch Equipment.
 - 5. IEC 947-6-1.
 - 6. IEEE Standard 446.

1.5 COORDINATION

- A. Coordinate size and location of transfer switches. Coordinate layout and installation of transfer switch with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Mount on concrete pads where indicated. 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.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. ATS to be furnished by Owner and turned over to contractor for installation. Provide all necessary equipment and material for complete and working installation.
- B. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

2.2 CONCRETE BASES

- A. Equipment Mounting (where floor-mounting is required): Install on concrete base, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 03 Section.
 - 1. Coordinate size of equipment bases with actual unit sizes provided. Fabricate base 4 inches larger in both directions than the overall dimensions of the supported unit. Chamfer top edge and corners of pad.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to transfer switch.

PART 3: EXECUTION

3.1 GENERAL INSTALLATION

- A. Transfer switches shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- C. Mount on 4" concrete bases where floor mounting is indicated.

3.2 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting transfer switch performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before transfer switch installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with transfer switch manufacturers' written installation and alignment instructions and with NFPA 110. Verify / coordinate generator manufacturers' written installation and alignment instructions.
- B. Identify components according to Division 26 Section "Identification for Electrical Systems."
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.4 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections per requirements below. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 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.
 - 3. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. 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.
- 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. Remove and replace malfunctioning units and retest as specified above.
- F. Include all test results in Owner's Operation, Maintenance, and Warranty Data manuals.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01 Section "Demonstration and Training." Include up to 4 hours training.
- B. Coordinate this training with that for generator equipment.

END OF SECTION 26 36 00

SECTION 26 51 00

LIGHTING

PART 1: GENERAL

1.1 SCOPE

- A. This Section includes the furnishing and installing of luminaires as shown and specified herein complete with lamps, supporting devices, and other appurtenances as required.
 - 1. Luminaires.
 - 2. LED systems.
 - 3. Luminaire supports.
 - 4. Lighting rebate forms.

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color-rendering index.
- C. LER: Luminaire efficacy rating.
- D. Lumen: Measured output of luminaire.
- E. Luminaire: Complete lighting fixture, including driver housing if provided.

1.3 SUBMITTALS

- A. Product Data: For each type of luminaire, pole and support component, arranged in order of luminaire designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of luminaire including dimensions.
 - 2. Rated life, lumen output, energy, and efficiency data for LED components.
 - 3. Materials, dimensions and finishes of poles.
 - 4. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
 - 5. Photometric data, in IESNA format, based on laboratory tests of each luminaire type, outfitted with lamps, ballasts, and accessories identical to those indicated for the luminaire as applied in this Project. For indicated fixtures photometric data shall be certified by a qualified independent testing agency, photometric data for remaining fixtures shall be certified by manufacturer.
 - 6. Installation instructions.
- B. Shop Drawings: Show details of nonstandard or custom luminaires. Indicate plans, elevations, sections, details and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: Power, signal and and control wiring.
- C. Operation, Maintenance and Warranty Data:
 - 1. For lighting equipment and luminaires to include in emergency, operation, maintenance and warranty data manuals.
 - 2. Special warranties specified in Part 3 of this Section.
- D. Product Certificates: For each type of dimming driver and associated dimmer controller, from luminaire manufacturer.
- E. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Lighting Rebates: Copy of completed lighting rebate forms, including all backup information and receipts.
- B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
 - 1. Provide record of rebate forms as part of O&M Manual. Refer to “Rebate Forms” in Part 2 below.
 - 2. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Submit record of transmittal as part of O&M Manual. Refer to “Extra Materials” article in Part 2 below.
 - 3. Submit record of warranty as part of O&M Manual. Refer to “Warranty” article in Part 1 below.

1.5 SUBSTITUTIONS

- A. Type, grade, quality and photometric data of luminaires are indicated on the Luminaire Schedules on the drawings by manufacturers’ specified Catalog Numbers. Substituted luminaires including outdoor luminaires, may be required to provide “Point-By-Point” layouts. Substituted luminaire manufacturers may require additional luminaires.
- B. Luminaires not listed on the schedule shall require submittal for prior approval. Coordinate exact requirements with Engineer.
- C. All submittals for parking lot luminaires must contain calculations showing maintained horizontal footcandle levels in the parking lot, complete with all light loss factor assumptions.

1.6 QUALITY ASSURANCE

- A. The equipment manufacturer shall be regularly engaged in manufacture of luminaires, of the types and capacities required, and whose products have been in satisfactory use in similar service for not less than ten years.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- D. The products provided by this section shall comply with the following applicable references (latest edition):
 - 1. ANSI C82.SSL1: SSL Drivers
 - 2. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
 - 3. IES-LM-79: LED Luminaires – Electrical and Photometric Measurements of Solid-State Lighting Products.
 - 4. IES-LM-80: LED Luminaires – Measuring Lumen Maintenance of LED Light Sources.
 - 5. IES-TM-21: LED Luminaires – Projection of LED Life.
 - 6. NEMA LE 4: Recessed Luminaires.
 - 7. NSF: Lighting fixtures for use in commercial kitchens shall be listed and labeled suitable for such use per National Sanitation Foundation standards.
 - 8. UL 924: Emergency Lighting and Power Equipment.
 - 9. UL 1598: Luminaires.

1.7 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including but not limited to structural members, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 WARRANTY

- A. Special Warranty for LED Fixtures: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace LED and driver components, or fixture in its entirety, that either partially or entirely fails in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for three years, and prorated warranty for the remaining seven years.
- C. Special Warranty for Exterior Luminaires, Poles and Accessories: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
 - 1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
 - 2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
 - 3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
 - 4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.
- D. Provide documentation of warranties in O&M Manual.

PART 2: PRODUCTS

2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards. Provide quick disconnects for light luminaires for wiring as required by Code.
- B. Where screw-in LED lamps are indicated on drawings and schedules provide luminaires with lamps for each outlet as required.
- C. The type luminaires required are as noted by a capital letter on the Drawings. Contractor shall be solely responsible for the exact quantities. Any outlets not specifically noted on the Drawings shall be equipped with luminaires similar to those in rooms used for like purposes.

2.2 MANUFACTURERS

- A. Products: subject to compliance with requirements below, provide products as indicated on the Drawings.

2.3 LUMINAIRES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Doors, Frames, and Other Internal Access:
 - 1. Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools unless otherwise noted. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.
 - 2. Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

- B. Metal Parts: Free of burrs and sharp corners and edges. Sheet metal shall be steel, unless otherwise indicated, and formed and supported to prevent warping and sagging.
- C. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- D. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation. Minimum lens thickness shall be .125 inch. UV stabilized.
 - 2. Glass: Annealed crystal glass, unless otherwise indicated.
- E. Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.
- F. Provide UL fire rated enclosure as required for luminaires installed in a rated ceiling if luminaires are not fire rated.
- G. Lighting fixtures shall have a specific means for grounding metallic wire-ways and housings to an equipment grounding conductor.
- H. Where color temperatures specified within this section differ from temperatures specified on plans the contractor shall obtain explicit verification of color temperature from engineer prior to ordering.
- I. Additional Requirements for Exterior Luminaires:
 - 1. Exposed Hardware Material: Stainless steel.
 - 2. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 3. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
 - 4. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
 - 5. Luminaire-Mounted Photoelectric Relays (where indicated):
 - a. Comply with UL 773 or UL 773A.
 - b. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff
 - 1) Relay with locking-type receptacle shall comply with ANSI C136.10.
 - 2) Adjustable window slide for adjusting on-off set points.
 - 6. Luminaire Finish:
 - a. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - b. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - 1) Color: If not specifically indicated on plans, finish and color shall be as selected by Architect.

2.4 LED SYSTEMS

- A. Provide driver as required for proper operation of fixture:
 - 1. The driver's maximum case temperature shall not be exceeded at the maximum operating ambient. Thermal management shall be passive by design.
 - 2. The use of fans or other mechanical devices is prohibited.

B. Technical requirements:

1. Fixtures shall be tested and rated per most recent edition of IES LM-79, IES LM-80, and IES TM-21 with rated life of 70,000 hours or greater.
 - a. Assume each luminaire will operate at an average operating time of twelve hours per day.
 - b. Each luminaire is expected to have a minimal operational life of 120 months (ten years).
2. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to ensure proper operation of the luminaire over the rated life.
 - a. The maximum junction temperature for the rated life shall not be exceeded at the average operating ambient.
 - b. The maximum junction temperature for the catastrophic failure shall not be exceeded at the maximum operating ambient.
3. The individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
4. Power Factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages.
5. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent at any standard input voltage.
6. Surge Suppression: The luminaire shall include surge protection to withstand high repetition noise and other interference.
 - a. The surge protection which may reside within the driver shall protect the luminaire from damage and failure for transient voltages and currents as defined in ANSI/IEEE C64.41 for Location Category A Low. Where failure does not mean a momentary loss of light during the transient event.
 - b. Surge protection performance shall be tested per the procedures in ANSI/IEEE C62.45 based on ANSI/IEEE C62.41 definitions for standard and optional waveforms for Location Category A-Low.
7. Operational Performance: The LED circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified above.
8. RF Interference: The luminaire and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.
9. Dimming (where indicated): The luminaire shall be capable of continuous dimming without perceivable flicker over a range of 100% to 5% of rated lumen output. Dimming shall be controlled by a 0-10V signal.
10. Lumen Management (where indicated): The luminaire shall be capable of continuously monitoring system performance to allow for constant lumen management / compensation function.
11. Output Color:
 - a. Interior Fixtures: Minimum CRI 80, and color temperature 4100 K (+/- 100K) unless noted otherwise.
 - b. Exterior Fixtures: Minimum CRI 70, and color temperature 4100 K (+/- 100K) unless noted otherwise.
12. Operating temperature (exterior and cold-weather interior fixtures only)
 - a. The operating temperature range shall be -40°F to +130°F.
 - b. Each luminaire shall be designed to operate at an average nighttime operating temperature of 70°F.
 - c. Each luminaire is expected to operate at a daytime ambient temperature of 104°F, and to comply with photometric requirements.
 - d. Parameters and tests (such as IES-LM-79, IES-LM-80 and IES-TM-21) shall be conducted at 104°F ambient temperatures.
 - e. Each luminaire shall meet all parameters of this specification throughout the minimum operational life when operated at the average nighttime operating temperature.

C. Protective Requirements for LED Systems in Pool Environments:

1. Provide coating on LED boards to prevent typical pool chemicals from breaking down LED emitters.
2. Provide gasketing to prevent off-gassing.

D. Housing for Exterior LED Systems:

1. The assembly and manufacturing process shall be designed to ensure all internal components are adequately supported to withstand mechanical shock and vibration.
2. The electronics/power supply enclosure shall be internal to the luminaire and be accessible per UL requirements.
3. The assembly and manufacturing process shall be designed to ensure all internal components are adequately supported to withstand mechanical shock and vibration from winds and other sources.

4. The housing shall be designed to prevent the build-up of water on the top of the housing. Exposed heat sink fins shall be oriented so that water can freely run off the luminaire, and carry dust and other accumulated debris away from the unit.
5. The optical assembly of the luminaire shall be protected against dust and moisture intrusion per the requirements of IP-65 (minimum) to protect all internal components.
6. The electronics/power supply enclosure shall be protected per the requirements of IP-43 (minimum).
7. When the components are mounted on a down opening door, the door shall be hinged and secured to the luminaire housing separately from the refractor or lens frame. The door shall be secured to the housing in a manner to prevent its accidental opening. A safety cable shall mechanically connect the door to the housing.

2.5 EXIT SIGNS AND EMERGENCY LIGHTING SYSTEMS

A. Exit Signs:

1. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
2. Internally Lighted Signs:
 - a. Universal voltage.
 - b. Lamps for AC operation: LED, 50,000 hours minimum rated lamp life.
 - c. Provide self-powered signs unless specifically noted on plans that signs are fed from external emergency power source and not required to contain internal batteries.
 - d. Self-Powered Exit Signs / Battery Type: Integral automatic charger in a self-contained power pack.
 - 1) Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 2) Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3) Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 4) Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 5) LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 6) Remote Test (where indicated): Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - 7) Integral Self-Test (where indicated): Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

B. Emergency Lighting Units (standalone battery wall packs):

1. Description: Self-contained units complying with UL 924.
 - a. Battery: Sealed, maintenance-free, lead-acid type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Wire Guard (where indicated): Heavy-chrome-plated wire guard protects lamp heads or luminaires.
 - g. Integral Time-Delay Relay (where indicated): Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
 - h. Remote Test (where indicated): Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

- i. Integral Self-Test (where indicated): Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.
- C. Integral Emergency Power Unit (battery integral to fixture):
- 1. Manufacturers: Bodine B50ST, IOTA, or approved equal.
 - 2. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with ballast. Comply with UL 924.
 - a. Emergency Connection: Operate luminaire continuously at 100% output. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire driver.
 - b. Night-Light Connection: Operate luminaire continuously at 100% output.
 - c. Test Push Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
 - 1) Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 2) Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - d. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - e. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - f. Remote Test (where indicated): Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - g. Integral Self-Test (where indicated): Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.
- D. Battery Inverter (remote battery):
- 1. Description: Inverter sized to feed LED fixture.
 - a. Battery: Sealed, maintenance-free, lead-acid type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically turns fixture on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Fixture automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects fixture from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Integral Time-Delay Relay (where indicated): Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
 - g. Remote Test (where indicated): Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - h. Integral Self-Test (where indicated): Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single luminaire. Finish same as luminaire.

- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- E. Wires for Humid Spaces (where indicated): ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to luminaire and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.7 LIGHTING REBATE

- A. Contractor shall coordinate with the local power company and the Owner as required to obtain all applicable lamp, ballast, and lighting control rebates. Apply the Utility's applicable rebate program to the project.
 - 1. Secure maximum rebate on behalf of the Owner.
 - 2. Complete all forms necessary to secure rebates.
 - 3. All Rebates shall be made directly to the Owner.
 - 4. Provide all invoicing and product information necessary to procure rebate.
- B. Provide final copies of completed rebate forms in O&M Manual.

2.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.
- B. Provide spare fixtures as indicated on luminaire schedule. Include ten feet of branch circuitry and all necessary labor for each fixture. For emergency and exit fixtures connected to generator systems include fifty feet of conduit and wire. Turn over unused spare fixtures to the Owner at the completion of the project.
- C. Provide documentation signed by Owner proving transmittal of the above materials from Contractor to Owner. Documentation shall include copy of "Extra Materials" article for reference. Include documentation in O&M Manual.

PART 3: EXECUTION

3.1 GENERAL INSTALLATION

- A. Luminaires shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Install luminaires at locations and heights as indicated. Set units plumb, square, and level with ceilings and walls and secure in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, with recognized industry practices to ensure that lighting luminaires fulfill requirements, and with Shop Drawings. Support luminaires in accordance with requirements of Section 16050, "Basic Electrical Materials and Methods".
- C. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- D. Luminaire types are indicated by a capital letter next to the luminaire. Small letters indicate switching patterns and numbers indicate circuit connection. Any luminaires not typed shall be assumed to be the same as adjacent luminaires or luminaires in like areas in the building.

- E. Height and Weight Considerations:
 - 1. Fixture heights are measured from finished floor to bottom of fixture, unless specifically noted otherwise.
 - 2. Where mounting heights are neither shown on electrical plans nor architectural elevations verify exact height with Architect/Engineer prior to rough-in and ordering of fixture.
 - 3. Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. If design of hangers or method of fastening, differs from what is indicated or specified herein then submit for review by Architect/Engineer.
- F. Luminaire finishes which are disturbed in any way during construction shall be touched up or refinished in a manner satisfactory to the Architect/Engineer.
- G. Adjust luminaires that require field adjustment or aiming. Include adjustment of integral photoelectric devices to prevent false operation of relay by artificial light sources, with exterior devices favoring a north orientation.
- H. Rectangular and square fixtures surface mounted or mounted in sheetrock, gypboard, plaster or similar ceilings shall be parallel or perpendicular to the building structure and accurately line up with respect to building elements and each other. If fixtures are not initially installed correctly the Contractor shall be responsible for any and all corrective work required to reinstall fixtures.
- I. Daisy-chaining of luminaires is not acceptable. Fixtures shall be whipped directly to junction boxes.

3.2 EXAMINATION / COORDINATION

- A. Examine conditions for compliance with lighting luminaire (luminaire) and ambient-temperature requirements for each luminaire.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, soffits, ceilings, floors, roofs, and parapets for suitable mounting conditions where luminaire will be installed.
- D. Examine / excavate site for suitable placement conditions for where concrete bases will be installed. Verify with civil and site plans for finish grade, curb, road, sidewalk, etc. locations.
- E. Verify that ground connections are in place and requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met.
- F. Coordinate layout and installation of luminaires and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

3.3 INSTALLATION OF INTERIOR LUMINAIRES

- A. Support for Luminaires in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - 1. Install a minimum of two ceiling support system rods or wires for each luminaire. Locate not more than 6 inches (150 mm) from luminaire corners.
 - 2. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for the application.
 - 3. Luminaires of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
 - 4. Install flush mounted luminaires to eliminate light leakage between luminaire frame and finished surface.
- B. Support for Flush Luminaires in Plaster / Gypsum – Type Suspended Ceilings: Use ceiling as a support element.
 - 1. Provide plaster frames for recessed luminaires installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
 - 2. Install flush mounted luminaires to eliminate light leakage between luminaire frame and finished surface.

- C. Suspended Luminaire Support:
 - 1. Fasten luminaires securely to structural supports and ensure that pendant luminaires are plumb and level. Do not support luminaires from the ceiling system. Provide individually mounted pendant luminaires longer than 2 feet with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum 1" vertical adjustment. Mount continuous rows of luminaires with an additional stem hanger greater than number of luminaires in the row.
 - 2. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
- D. Surface Flush mounted Luminaires:
 - 1. Support surface mounted luminaires greater than 2 feet in length at a point in addition to the outlet box luminaire stud. At surface mounted luminaires mounted over flush mounted junction box, provide opening through luminaire to junction box for wiring access.
- E. Install THHN 90°C wire minimum for wiring entering the ballast chamber such as pendant wiring, whips, flexible cords, or through ballast chambers in continuous row luminaires. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
 - 1. Connectors: Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and the National Electrical Code.
- F. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's instructions.
- G. Provide guards for exit light and emergency battery wall pack light luminaires in gymnasiums and where indicated.

3.4 INSTALLATION OF EXTERIOR LUMINAIRES

- A. Building-Mounted Exterior Luminaires:
 - 1. Comply with "Installation of Interior Luminaires" above.
 - 2. In damp and wet locations seal luminaire infrastructure (i.e. knockouts, pipe and wiring entrances, etc.) as is standard industry practice to prevent water from entering luminaires.
- B. Corrosion Prevention:
 - 1. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
 - 2. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254 –mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components. Replace luminaires that show evidence of corrosion during Project warranty period.
- B. Emergency / Egress Lighting Tests: Verify normal power operation of each luminaire after luminaires have been installed and circuits have been energized with normal power source. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation. Include the following information in tests of emergency lighting equipment:
 - 1. Duration of supply.
 - 2. Low battery voltage shutdown.
 - 3. Normal transfer to battery source and retransfer to normal.
 - 4. Low supply voltage transfer.
- C. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - 1. Verify operation of photoelectric controls, either by observation of fixtures being on at night and off during the day, or by simulating darkness by temporarily covering photoelectric controls. Report observations in writing to Architect/Engineer.

- D. Replace or repair malfunctioning luminaires and components, then retest. Repeat procedure until all units operate properly.
- E. Replace defective and burned out lamps for a period of one year following the Date of Substantial Completion.
- F. At Date of Substantial Completion, replace lamps in lighting luminaires which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect/Engineer.
- G. Refer to Division 1 sections for the replacement/restoration of lamps in lighting luminaires, where used for temporary lighting prior to Date of Substantial Completion.
- H. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.6 CLEANING / PROTECTION

- A. Clean luminaires of dirt and construction debris after completion of installation. Clean fingerprints and smudges from lenses. Use methods and materials recommended by manufacturer.
- B. Protect luminaires before, during and after installation from construction dust and debris.
- C. Clean all luminaire surfaces, lenses and/or louvers after completion of construction.
- D. Protect installed luminaires from damage during remainder of construction period.

3.7 DEMONSTRATION

- A. Upon completion of installation of luminaires, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then re-test to demonstrate compliance; otherwise, remove and replace with new units, and proceed with re-testing.

END OF SECTION 26 51 00

SECTION 26 70 00

RACEWAY FOR LOW VOLTAGE SYSTEMS

PART 1: GENERAL

1.1 SCOPE

- A. Work under this section includes the furnishing and installation of raceway systems:
 - 1. For Division 27 and 28 systems, as specified herein and as shown on the drawings.
 - 2. For systems installed by others (Owner, Owner's vendor, etc), where rough-in requirements are shown on drawings.

1.2 RELATED SECTIONS

- A. Section 260500 - General Requirements
- B. Section 260533 - Raceway and Boxes for Electrical Systems
- C. Division 27 and 28.

1.3 COORDINATION

- A. Systems as listed within this section are provide by Owner or Owner's vendor complete with devices, racks, head end equipment, and wiring/cables, unless otherwise indicated.
- B. Typical conduit sizes and box locations are shown on plans. Coordinate conduit and rough-in requirements and locations with Owner or Owner's vendor for each system prior to rough-in.
- C. Coordinate rough-in locations with casework, furniture, openings, door swing, other trades, etc.

PART 2: PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Conduit - Refer to Section 26 05 33

2.2 COMMUNICATIONS RACEWAY AND BOXES SYSTEMS

- A. Boxes:
 - 1. Unless noted otherwise, outlet boxes shall be 4" square extra deep galvanized steel with single gang mud ring.
- B. Raceway:
 - 1. Conduit shall be minimum 1" or as sized on drawings.
 - a. Provide type EMT where concealed in walls and ceilings or exposed in unfinished spaces.
 - b. Provide surface raceway where exposed in finished spaces.
 - c. Provide PVC where buried in earth or in concrete.
 - 2. Conduits shall be concealed wherever possible.

2.3 GENERAL ITEMS

A. Sleeves:

1. Provide all sleeves necessary for low voltage system installation. Required sleeve paths are not necessarily all shown on plans.

B. Coverplates:

1. Systems outlets will be equipped with plates provided by the Owner's vendor. Equip all unactivated outlets with blank plates to match specified wiring device plates. Coordinate with Owner's vendor.

C. Backboards:

1. Provide plywood backboards for systems provided by Owner or Owner's Vendor. Backboards shall be commercial grade 3/4" thick plywood sized as shown on drawings and painted on front and edges with light gray flame retardant enamel.

PART 3: EXECUTION

3.1 INSTALLATION

A. Conduits:

1. Conduits shall be stubbed into the nearest accessible ceiling space. Where accessible ceiling space is not available to provide a cabling path to the point of termination, provide empty conduit or raceway as required or as indicated on plans.
2. Install a maximum of two 90-degree bends or the equivalent for each length of raceway unless Drawings indicate otherwise. Provide bushed ends on all raceway stub-ups.
3. Provide a pull string in each conduit. If conduit is not used during construction, secure each end within raceway system prior to installing the blank coverplate.

B. Sleeves:

1. All openings in firewalls and floors for low voltage cables shall be filled by this contractor with removable fire-retardant material unless openings are fireproofed by low voltage vendor prior to substantial completion of the project. Refer to Section 26 05 33.

- C. At least one quadruplex receptacle on a 120V 20A dedicated circuit shall be provided at each low voltage terminal board or cabinet, unless otherwise noted. Verify mounting heights and specific locations with Owner or Owner's vendors prior to installation.

END OF SECTION 26 70 00