

PROJECT MANUAL AND SPECIFICATIONS

**2014-15 MAINTENANCE NEEDS
MUSC IoP GENERATOR REPLACEMENT**

MEDICAL UNIVERSITY OF SOUTH CAROLINA

Charleston, SC

STATE PROJECT NO. : H51-9828-JS

ENGINEER'S PROJECT NO. : 20170078



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DATE: February 23, 2018

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Note: This index is for convenience only. Its accuracy and completeness are not guaranteed, and it is not to be considered as part of this Project Manual. In the case of a discrepancy between the Index and the Project Manual, the Project Manual shall govern.

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2014-15 MAINTENANCE NEEDS
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SE-310

INVITATION FOR CONSTRUCTION SERVICES

PROJECT NAME: IoP Generator ReplacementPROJECT NUMBER: 9828-CPROJECT LOCATION: MUSC Institute of Psychiatry, Charleston SCBID SECURITY REQUIRED? Yes ☒ No ☐PERFORMANCE BOND REQUIRED? Yes ☒ No ☐PAYMENT BOND REQUIRED? Yes ☒ No ☐

NOTE: Contractor may be subject to a performance appraisal at the close of the project.

CONSTRUCTION COST RANGE: \$ 285,000-315,000

DESCRIPTION OF PROJECT: Replace and connect the failed generators on roof of MUSC IoP Hospital. MUSC has two generators on the roof of the Psychiatry Hospital; one 500kW diesel generator and one 400kW diesel generator. Both generators are inoperable and will be removed from the roof. A new 800kW Diesel Generator will be installed in the location that the 500kW diesel generator resides. New steel will be added to this location to allow for the larger footprint of the new generator. The new generator will split feed the two existing cable runs (from the two failed generators) via independent 800A circuit breakers on the generator. Some of the existing infrastructure associated with the failed units will be utilized with the new installation. Namely, the two existing cable pull boxes on the roof will be replaced by splice boxes and the cable, from those points, downstairs will be re-utilized for connection to ATSs #1 and #4.

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: Contract documents are available from this web site: http://academicdepartments.musc.edu/vpfa/eandf/construction_projects/

PLAN DEPOSIT AMOUNT: \$ \$0.00

IS DEPOSIT REFUNDABLE

Yes ☐No ☐N/A ☒

Bidders must obtain Bidding Documents/Plans from the above listed source(s) to be listed as an official plan holder. Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders that rely on copies of Bidding Documents/Plans obtained from any other source do so at their own risk. All written communications with official plan holders & bidders WILL ☒ WILL NOT ☐ be via email or website posting.

IN ADDITION TO THE ABOVE OFFICIAL SOURCE(S), BIDDING DOCUMENTS/PLANS ARE ALSO AVAILABLE AT:
NA

All questions & correspondence concerning this Invitation shall be addressed to the A/E.

A/E NAME: Engineering Consultant - Live Oak Consultants, LLCA/E CONTACT: Nathan BairdA/E ADDRESS: Street/PO Box: 4214 Fellowship RoadCity: North CharlestonState: SCZIP: 29418-EMAIL: nbaird@liveoakconsultants.comTELEPHONE: 843-266-8263

FAX: _____

AGENCY: H51 - Medical University of South CarolinaAGENCY PROJECT COORDINATOR: Jimmy StewartADDRESS: Street/PO Box: 97 Jonathan Lucas StreetCity: CharlestonState: SCZIP: 29425-EMAIL: stewartjh@musc.eduTELEPHONE: 843-792-3753

FAX: _____

PRE-BID CONFERENCE: Yes ☒ No ☐

MANDATORY ATTENDANCE:

Yes ☐No ☒PRE-BID DATE: 3/2/2018TIME: 10:00 AMPLACE: 67 Presidents Street, PH145 AuditoriumBID CLOSING DATE: 3/19/2018TIME: 2:00 PMPLACE: 325 Calhoun Street, Room 42

BID DELIVERY ADDRESSES:

HAND-DELIVERY:

Attn: Debbie Zerba, Susie Watts, or Kim Young325 Calhoun StreetCharleston, SC 29425

MAIL SERVICE:

Attn: Bid for Jimmy Stewart97 Jonathan Lucas StreetCharleston, SC 29425

IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? (Agency MUST check one)

Yes ☒No ☐APPROVED BY: James H. Stewart

(OSE Project Manager)

DATE: 2-21-2018

South Carolina Division of Procurement Services, Office of the State Engineer Version of **AIA**® Document A701™ – 1997

Instructions to Bidders

This version of AIA Document A701™–1997 is modified by the South Carolina Division of Procurement Services, Office of the State Engineer (“SCOSE”). Publication of this version of AIA Document A701–1997 does not imply the American Institute of Architects’ endorsement of any modification by SCOSE. A comparative version of AIA Document A701–1997 showing additions and deletions by SCOSE is available for review on the SCOSE Web site.

Cite this document as “AIA Document A701™– 1997, Instructions to Bidders — SCOSE Version,” or “AIA Document A701™–1997 — SCOSE Version.”

South Carolina Division of Procurement Services, Office of the State Engineer Version of AIA Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:

(Name and location or address)

IoP Generator Replacement

67 Presidents Street, Charleston, SC 29425

THE OWNER:

(Name, legal status and address)

MUSC

97 Jonathan Lucas Street

Charleston, SC 29425

The Owner is a Governmental Body of the State of South Carolina as defined by Title 11, Chapter 35 of the South Carolina Code of Laws, as amended.

THE ARCHITECT:

(Name, legal status and address)

Engineer - Lee Metz, PE (Live Oak Consultants)

4214 Fellowship Road

North Charleston, SC 29418

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents, collectively referred to as the **Invitation for Bids**, include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement, Instructions to Bidders, Supplementary Instructions to Bidders, the Bid Form, the Notice of Intent to Award, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract, and other documents set forth in the Bidding Documents. Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean AIA Document A101™–2007 Standard Form of Agreement Between Owner and Contractor, SCOSE edition. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean AIA Document A201™–2007 General Conditions of the Contract for Construction, SCOSE edition.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by submitting a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents and Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction. Bidders are expected to examine the Bidding Documents and Contract Documents thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements. Failure to do so will be at the Bidder's risk. Bidder assumes responsibility for any patent ambiguity that Bidder does not bring to the Owner's attention prior to bid opening.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents and accepts full responsibility for any pre-bid existing conditions that would affect the Bid that could have been ascertained by a site visit. As provided in Regulation 19-445.2042(B), a bidder's failure to attend an advertised pre-bid conference will not excuse its responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the State.

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§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

§ 2.1.5 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

GIVING FALSE, MISLEADING, OR INCOMPLETE INFORMATION ON THIS CERTIFICATION MAY RENDER YOU SUBJECT TO PROSECUTION UNDER SECTION 16-9-10 OF THE SOUTH CAROLINA CODE OF LAWS AND OTHER APPLICABLE LAWS.

§ 2.1.5.1 By submitting a bid, the bidder certifies that:

- .1 The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to:
 - .1 those prices;
 - .2 the intention to submit a bid; or
 - .3 the methods or factors used to calculate the prices offered.
- .2 The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and
- .3 No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

§ 2.1.5.2 Each signature on the bid is considered to be a certification by the signatory that the signatory:

- .1 Is the person in the bidder's organization responsible for determining the prices being offered in this bid, and that the signatory has not participated and will not participate in any action contrary to Section 2.1.5.1 of this certification; or
- .2 Has been authorized, in writing, to act as agent for the bidder's principals in certifying that those principals have not participated, and will not participate in any action contrary to Section 2.1.5.1 of this certification [As used in this subdivision, the term "principals" means the person(s) in the bidder's organization responsible for determining the prices offered in this bid];
- .3 As an authorized agent, does certify that the principals referenced in Section 2.1.5.2.2 of this certification have not participated, and will not participate, in any action contrary to Section 2.1.5.1 of this certification; and
- .4 As an agent, has not personally participated, and will not participate, in any action contrary to Section 2.1.5.1 of this certification.

§ 2.1.5.3 If the bidder deletes or modifies Section 2.1.5.1.2 of this certification, the bidder must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

§ 2.1.6 DRUG FREE WORKPLACE

By submitting a bid, the Bidder certifies that Bidder will maintain a drug free workplace in accordance with the requirements of Title 44, Chapter 107 of South Carolina Code of Laws, as amended.

§ 2.1.7 CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS

§ 2.1.7.1 By submitting a Bid, Bidder certifies, to the best of its knowledge and belief, that:

- .1 Bidder and/or any of its Principals-
 - .1 Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;
 - .2 Have not, within a three-year period preceding this bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and
 - .3 Are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in Section 2.1.7.1.1.2 of this provision.
- .2 Bidder has not, within a three-year period preceding this bid, had one or more contracts terminated for default by any public (Federal, state, or local) entity.

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- .3 "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

§ 2.1.7.2 Bidder shall provide immediate written notice to the Procurement Officer if, at any time prior to contract award, Bidder learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

§ 2.1.7.3 If Bidder is unable to certify the representations stated in Section 2.1.7.1, Bidder must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the Bidder's responsibility. Failure of the Bidder to furnish additional information as requested by the Procurement Officer may render the Bidder nonresponsible.

§ 2.1.7.4 Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by Section 2.1.7.1 of this provision. The knowledge and information of a Bidder is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

§ 2.1.7.5 The certification in Section 2.1.7.1 of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Bidder knowingly or in bad faith rendered an erroneous certification, in addition to other remedies available to the State, the Procurement Officer may terminate the contract resulting from this solicitation for default.

§ 2.1.8 ETHICS CERTIFICATE

By submitting a bid, the bidder certifies that the bidder has and will comply with, and has not, and will not, induce a person to violate Title 8, Chapter 13 of the South Carolina Code of Laws, as amended (Ethics Act). The following statutes require special attention: Section 8-13-700, regarding use of official position for financial gain; Section 8-13-705, regarding gifts to influence action of public official; Section 8-13-720, regarding offering money for advice or assistance of public official; Sections 8-13-755 and 8-13-760, regarding restrictions on employment by former public official; Section 8-13-775, prohibiting public official with economic interests from acting on contracts; Section 8-13-790, regarding recovery of kickbacks; Section 8-13-1150, regarding statements to be filed by consultants; and Section 8-13-1342, regarding restrictions on contributions by contractor to candidate who participated in awarding of contract. The state may rescind any contract and recover all amounts expended as a result of any action taken in violation of this provision. If the contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders regarding a public contract, the contractor shall, if required by law to file such a statement, provide the statement required by Section 8-13-1150 to the procurement officer at the same time the law requires the statement to be filed.

§ 2.1.9 RESTRICTIONS APPLICABLE TO BIDDERS & GIFTS

Violation of these restrictions may result in disqualification of your bid, suspension or debarment, and may constitute a violation of the state Ethics Act.

§ 2.1.9.1 After issuance of the solicitation, *bidder agrees not to discuss this procurement activity in any way with the Owner or its employees, agents or officials*. All communications must be solely with the Procurement Officer. This restriction may be lifted by express written permission from the Procurement Officer. This restriction expires once a contract has been formed.

§ 2.1.9.2 Unless otherwise approved in writing by the Procurement Officer, *bidder agrees not to give anything to the Owner, any affiliated organizations, or the employees, agents or officials of either, prior to award*.

§ 2.1.9.3 Bidder acknowledges that the policy of the State is that a governmental body should not accept or solicit a gift, directly or indirectly, from a donor if the governmental body has reason to believe the donor has or is seeking to obtain contractual or other business or financial relationships with the governmental body. Regulation 19-445.2165(C) broadly defines the term donor.

§ 2.1.10 IRAN DIVESTMENT ACT CERTIFICATION

§ 2.1.10.1 The Iran Divestment Act List is a list published by the State Fiscal Accountability Authority pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the

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following URL: <http://procurement.sc.gov/PS/PS-iran-divestment.phtm>(.) Section 11-57-310 requires the government to provide a person ninety days written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the State to award a contract to you.

§ 2.1.10.2 By signing your Offer, you certify that, as of the date you sign, you are not on the then-current version of the Iran Divestment Act List.

§ 2.1.10.3 You must notify the Procurement Officer immediately if, at any time before posting of a final statement of award, you are added to the Iran Divestment Act List.

§ 2.1.11 OPEN TRADE REPRESENTATION (JUN 2015)

By submitting an Offer, the Offeror represents that Offeror is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [02-2A083-1]

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement in the number and for the deposit sum, if any, stated therein. If so provided in the Advertisement, the deposit will be refunded to all plan holders who return the Bidding Documents in good condition within ten (10) days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.1.3 The Owner has made copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

§ 3.1.4 All persons obtaining Bidding Documents from the issuing office designated in the Advertisement shall provide that office with Bidder's contact information to include the Bidder's name, telephone number, mailing address, and email address.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least ten (10) days prior to the date for receipt of Bids.

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by written Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them. As provided in Regulation 19-445.2042(B), nothing stated at the pre-bid conference shall change the Bidding Documents unless a change is made by written Addendum.

§ 3.3 SUBSTITUTIONS

§ 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. Reference in the Bidding Documents to a designated material, product, thing, or service by specific brand or trade name followed by the words "or equal" and "or approved equal" shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

§ 3.3.2 No request to substitute materials, products, or equipment for materials, products, or equipment described in the Bidding Documents and no request for addition of a manufacturer or supplier to a list of approved manufacturers or suppliers in the Bidding Documents will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten (10) days prior to the date for receipt of Bids established in the Invitation for

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Bids. Any subsequent extension of the date for receipt of Bids by addendum shall not extend the date for receipt of such requests unless the addendum so specifies. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

§ 3.4.3 Addenda will be issued no later than 120 hours prior to the time for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

§ 3.4.5 When the date for receipt of Bids is to be postponed and there is insufficient time to issue a written Addendum prior to the original Bid Date, the Owner will notify prospective Bidders by telephone or other appropriate means with immediate follow up with a written Addendum. This Addendum will verify the postponement of the original Bid Date and establish a new Bid Date. The new Bid Date will be no earlier than the fifth (5th) calendar day after the date of issuance of the Addendum postponing the original Bid Date.

§ 3.4.6 If an emergency or unanticipated event interrupts normal government processes so that bids cannot be received at the government office designated for receipt of bids by the exact time specified in the solicitation, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal government processes resume. In lieu of an automatic extension, an Addendum may be issued to reschedule bid opening. If state offices are closed at the time a pre-bid or pre-proposal conference is scheduled, an Addendum will be issued to reschedule the conference.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the SE-330 Bid Form included with the Bidding Documents.

§ 4.1.2 Any blanks on the bid form to be filled in by the Bidder shall be legibly executed in a non-erasable medium. Bids shall be signed in ink or other indelible media.

§ 4.1.3 Sums shall be expressed in figures.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid. Bidder shall not make stipulations or qualify his bid in any manner not permitted on the bid form. An incomplete Bid or information not requested that is written on or attached to the Bid Form that could be considered a qualification of the Bid, may be cause for rejection of the Bid.

§ 4.1.5 All requested Alternates shall be bid. The failure of the bidder to indicate a price for an Alternate shall render the Bid non-responsive. Indicate the change to the Base Bid by entering the dollar amount and marking, as appropriate, the box for "ADD TO" or "DEDUCT FROM". If no change in the Base Bid is required, enter "ZERO" or "No Change."

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For add alternates to the base bid, Subcontractor(s) listed on page BF-2 of the Bid Form to perform Alternate Work shall be used for both Alternates and Base Bid Work if Alternates are accepted.

§ 4.1.6 Pursuant to Title 11, Chapter 35, Section 3020(b)(i) of the South Carolina Code of Laws, as amended, Section 7 of the Bid Form sets forth a list of subcontractor specialties for which Bidder is required to identify only those subcontractors Bidder will use to perform the work of each listed specialty. Bidder must follow the Instructions in the Bid Form for filling out this section of the Bid Form. Failure to properly fill out Section 7 may result in rejection of Bidder's bid as non-responsive.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.2 BID SECURITY

§ 4.2.1 If required by the Invitation for Bids, each Bid shall be accompanied by a bid security in an amount of not less than five percent of the Base Bid. The bid security shall be a bid bond or a certified cashier's check. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney. The bid bond shall:

- .1 be issued by a surety company licensed to do business in South Carolina;
- .2 be issued by a surety company having, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty", which company shows a financial strength rating of at least five (5) times the contract price.
- .3 be enclosed in the bid envelope at the time of Bid Opening, either in paper copy or as an electronic bid bond authorization number provided on the Bid Form and issued by a firm or organization authorized by the surety to receive, authenticate and issue binding electronic bid bonds on behalf the surety.

§ 4.2.3 By submitting a bid bond via an electronic bid bond authorization number on the Bid Form and signing the Bid Form, the Bidder certifies that an electronic bid bond has been executed by a Surety meeting the standards required by the Bidding Documents and the Bidder and Surety are firmly bound unto the State of South Carolina under the conditions provided in this Section 4.2.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and performance and payment bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall, unless hand delivered by the Bidder, be addressed to the Owner's designated purchasing office as shown in the Invitation for Bids. The envelope shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail or special delivery service (UPS, Federal Express, etc.), the envelope should be labeled "BID ENCLOSED" on the face thereof. Bidders hand delivering their Bids shall deliver Bids to the place of the Bid Opening as shown in the Invitation for Bids. Whether or not Bidders attend the Bid Opening, they shall give their Bids to the Owner's procurement officer or his/her designee as shown in the Invitation for Bids prior to the time of the Bid Opening.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.3.5 The official time for receipt of Bids will be determined by reference to the clock designated by the Owner's procurement officer or his/her designee. The procurement officer conducting the Bid Opening will determine and announce that the deadline has arrived and no further Bids or bid modifications will be accepted. All Bids and bid modifications in the possession of the procurement officer at the time the announcement is completed will be timely, whether or not the bid envelope has been date/time stamped or otherwise marked by the procurement officer.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be withdrawn in person or by written notice to the party receiving Bids at the place designated for receipt of Bids. Withdrawal by written notice shall be in writing over the signature of the Bidder.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

§ 5.1.1 Bids received on time will be publicly opened and will be read aloud. The Owner will not read aloud Bids that the Owner determines, at the time of opening, to be non-responsive.

§ 5.1.2 At bid opening, the Owner will announce the date and location of the posting of the Notice of Intended Award.

§ 5.1.3 The Owner will send a copy of the final Bid Tabulation to all Bidders within ten (10) working days of the Bid Opening.

§ 5.1.4 If the Owner determines to award the Project, the Owner will, after posting a Notice of Intended Award, send a copy of the Notice to all Bidders.

§ 5.1.5 If only one Bid is received, the Owner will open and consider the Bid.

§ 5.2 REJECTION OF BIDS

§ 5.2.1 The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.2.2 The reasons for which the Owner will reject Bids include, but are not limited to:

- .1 Failure by a Bidder to be represented at a Mandatory Pre-Bid Conference or site visit;
- .2 Failure to deliver the Bid on time;
- .3 Failure to comply with Bid Security requirements, except as expressly allowed by law;
- .4 Listing an invalid electronic Bid Bond authorization number on the bid form;
- .5 Failure to Bid an Alternate, except as expressly allowed by law;
- .6 Failure to list qualified Subcontractors as required by law;
- .7 Showing any material modification(s) or exception(s) qualifying the Bid;
- .8 Faxing a Bid directly to the Owner or their representative; or
- .9 Failure to include a properly executed Power-of-Authority with the bid bond.

§ 5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid

will result in the lowest overall cost to the Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S RESPONSIBILITY

Owner will make a determination of Bidder's responsibility before awarding a contract. Bidder shall provide all information and documentation requested by the Owner to support the Owner's evaluation of responsibility. Failure of Bidder to provide requested information is cause for the Owner, at its option, to determine the Bidder to be non-responsible.

§ 6.2 CLARIFICATION

Pursuant to Section 11-35-1520(8), the Procurement Officer may elect to communicate with a Bidder after opening for the purpose of clarifying either the Bid or the requirements of the Invitation for Bids. Such communications may be conducted only with Bidders who have submitted a Bid which obviously conforms in all material aspects to the Invitation for Bids and only in accordance with Appendix E (Paragraph A(6)) to the Manual for Planning and Execution of State Permanent Improvement, Part II. Clarification of a Bid must be documented in writing and included with the Bid. Clarifications may not be used to revise a Bid or the Invitation for Bids. [Section 11-35-1520(8); R.19-445.2080].

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 7.1.2 The performance and payment bonds shall conform to the requirements of Section 11.4 of the General Conditions of the Contract. If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid.

§ 7.2 TIME OF DELIVERY CONTRACT, CERTIFICATES OF INSURANCE AND FORM OF BONDS

§ 7.2.1 After expiration of the protest period, the Owner will tender a signed Contract for Construction to the Bidder and the Bidder shall return the fully executed Contract for Construction to the Owner within seven (7) days thereafter. The Bidder shall deliver the required bonds and certificate of insurance to the Owner not later than three (3) days following the date of execution of the Contract. Failure to deliver these documents as required shall entitle the Owner to consider the Bidder's failure as a refusal to enter into a contract in accordance with the terms and conditions of the Bidder's Bid and to make claim on the Bid Security for re-procurement cost.

§ 7.2.2 The bonds shall be dated on or after the date of the Contract.

Init.

§ 7.2.3 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor, SCOSE edition.

ARTICLE 9 MISCELLANEOUS

§ 9.1 NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING IMPORTANT TAX NOTICE - NONRESIDENTS ONLY

§ 9.1.1 Withholding Requirements for Payments to Nonresidents: Section 12-8-550 of the South Carolina Code of Laws requires persons hiring or contracting with a nonresident conducting a business or performing personal services of a temporary nature within South Carolina to withhold 2% of each payment made to the nonresident. The withholding requirement does not apply to (1) payments on purchase orders for tangible personal property when the payments are not accompanied by services to be performed in South Carolina, (2) nonresidents who are not conducting business in South Carolina, (3) nonresidents for contracts that do not exceed \$10,000 in a calendar year, or (4) payments to a nonresident who (a) registers with either the S.C. Department of Revenue or the S.C. Secretary of State and (b) submits a Nonresident Taxpayer Registration Affidavit - Income Tax Withholding, Form I-312 to the person letting the contract.

§ 9.1.2 For information about other withholding requirements (e.g., employee withholding), contact the Withholding Section at the South Carolina Department of Revenue at 803-898-5383 or visit the Department's website at: www.sctax.org

§ 9.1.3 This notice is for informational purposes only. This Owner does not administer and has no authority over tax issues. All registration questions should be directed to the License and Registration Section at 803-898-5872 or to the South Carolina Department of Revenue, Registration Unit, Columbia, S.C. 29214-0140. All withholding questions should be directed to the Withholding Section at 803-898- 5383.

PLEASE SEE THE "NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING" FORM (Available through SC Department of Revenue).

§ 9.2 CONTRACTOR LICENSING

Contractors and Subcontractors listed in Section 7 of the Bid Form who are required by the South Carolina Code of Laws to be licensed, must be licensed at the time of bidding.

§ 9.3 SUBMITTING CONFIDENTIAL INFORMATION

§ 9.3.1 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that the Bidder contends contains information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in Section 11-35-410.

§ 9.3.2 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that the Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act.

§ 9.3.3 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that the Bidder contends is protected by Section 11-35-1810.

§ 9.3.4 All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text. Do not mark your entire bid as confidential, trade secret, or protected! If your bid, or any part thereof, is improperly marked as confidential or trade secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page.

§ 9.3.5 By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract

Init.

(including, but not limited to, documents contained in a response, documents submitted to clarify a response, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure.

§ 9.3.6 In determining whether to release documents, the State will detrimentally rely on the Bidders' marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED".

§ 9.3.7 By submitting a response, the Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

§ 9.4 POSTING OF INTENT TO AWARD

The SE-370, Notice of Intent to Award, will be posted at the following location:

Room or Area of Posting:

Building Where Posted:

Address of Building:

WEB site address (if applicable):

Posting date will be announced at bid opening. In addition to posting the notice, the Owner will promptly send all responsive bidders a copy of the notice of intent to award and the final bid tabulation

§ 9.5 PROTEST OF SOLICITATION OR AWARD

§ 9.5.1 Any prospective bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the solicitation of a contract shall protest within fifteen (15) days of the date of issuance of the applicable solicitation document at issue. Any actual bidder, offeror, contractor, or subcontractor who is aggrieved in connection with the intended award or award of a contract shall protest within ten (10) days of the date notification of intent to award is posted in accordance with Title 11, Chapter 35, Section 4210 of the South Carolina Code of Laws, as amended. A protest shall be in writing, shall set forth the grounds of the protest and the relief requested with enough particularity to give notice of the issues to be decided, and must be received by the State Engineer within the time provided.

§ 9.5.2 Any protest must be addressed to the CPO, Office of State Engineer, and submitted in writing:

- .1 by email to protest-ose@mmo.sc.gov,
- .2 by facsimile at 803-737-0639, or
- .3 by post or delivery to 1201 Main Street, Suite 600, Columbia, SC 29201.

By submitting a protest to the foregoing email address, you (and any person acting on your behalf) consent to receive communications regarding your protest (and any related protests) at the e-mail address from which you sent your protest.

§ 9.6 SOLICITATION INFORMATION FROM SOURCES OTHER THAN OFFICIAL SOURCE

South Carolina Business Opportunities (SCBO) is the official state government publication for State of South Carolina solicitations. Any information on State agency solicitations obtained from any other source is unofficial and any reliance placed on such information is at the bidder's sole risk and is without recourse under the South Carolina Consolidated Procurement Code.

§ 9.7 BUILDER'S RISK INSURANCE

Bidders are directed to Article 11.3 of the South Carolina Modified AIA Document A201, 2007 Edition, which, unless provided otherwise in the bid documents, requires the contractor to provide builder's risk insurance on the project.

§ 9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS

§ 9.8.1 Pursuant to Section 12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The

taxpayer is eligible to claim the credit for 10 consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. The credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return.

§ 9.8.2 Taxpayers must maintain evidence of work performed for a State contract by the minority subcontractor. Questions regarding the tax credit and how to file are to be referred to: SC Department of Revenue, Research and Review, Phone: (803) 898-5786, Fax: (803) 898-5888.

§ 9.8.3 The subcontractor must be certified as to the criteria of a "Minority Firm" by the Governor's Office of Small and Minority Business Assistance (OSMBA). Certificates are issued to subcontractors upon successful completion of the certification process. Questions regarding subcontractor certification are to be referred to: Governor's Office of Small and Minority Business Assistance, Phone: (803) 734-0657, Fax: (803) 734-2498. Reference: SC §11-35-5010 – Definition for Minority Subcontractor & SC §11-35-5230 (B) – Regulations for Negotiating with State Minority Firms.

§ 9.9 OTHER SPECIAL CONDITIONS OF THE WORK



AIA Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

MUSC

97 Jonathan Lucas Street, Charleston SC 29425

BOND AMOUNT:

PROJECT:

(Name, location or address, and Project number, if any)

IoP Generator Replacement

67 Presidents Street, Charleston SC 29425

Project Number, if any:

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this _____ day of _____

(Witness)

(Principal)

(Seal)

(Title)

(Witness)

(Surety)

(Seal)

(Title)

SE-330

LUMP SUM BID FORM

Bidders shall submit bids on only Bid Form SE-330.

BID SUBMITTED BY: _____
(Bidder's Name)

BID SUBMITTED TO: Jimmy Stewart
(Owner's Name)

FOR: PROJECT NAME: IoP Generator Replacement
PROJECT NUMBER: 9828-C

OFFER

§ 1. In response to the Invitation for Construction Services and in compliance with the Instructions to Bidders for the above-named Project, the undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with the Owner on the terms included in the Bidding Documents, and to perform all Work as specified or indicated in the Bidding Documents, for the prices and within the time frames indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

§ 2. Pursuant to Section 11-35-3030(1) of the SC Code of Laws, as amended, Bidder has submitted Bid Security as follows in the amount and form required by the Bidding Documents:

☐ **Bid Bond with Power of Attorney** ☐ **Electronic Bid Bond** ☐ **Cashier's Check**
(Bidder check one)

§ 3. Bidder acknowledges the receipt of the following Addenda to the Bidding Documents and has incorporated the effects of said Addenda into this Bid:

(Bidder, check all that apply. Note, there may be more boxes than actual addenda. Do not check boxes that do not apply)

ADDENDA: ☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

§ 4. Bidder accepts all terms and conditions of the Invitation for Bids, including, without limitation, those dealing with the disposition of Bid Security. Bidder agrees that this Bid, including all Bid Alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of **60** Days following the Bid Date, or for such longer period of time that Bidder may agree to in writing upon request of the Owner.

§ 5. Bidder herewith offers to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fees, permits, licenses and applicable taxes necessary to complete the following items of construction work:

§ 6.1 **BASE BID WORK** (as indicated in the Bidding Documents and generally described as follows): Two inoperable generators to be replaced with one larger capacity generator. There will be additional steel added to existing steel to accommodate the new generator. The existing rooftop fuel tank will be re-utilized via new piping. Electrical power connections will be made in a new splice boxes located on the rooftop. Appropriate grounding, lightning and control system modifications will be made as part of the installation.

\$ _____, which sum is hereafter called the Base Bid.

(Bidder to insert Base Bid Amount on line above)

SE-330**LUMP SUM BID FORM**

**§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i),
CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED**
(See Instructions on the following page BF-2A)

Bidder shall use the below-listed Subcontractors in the performance of the Subcontractor Classification work listed:

SUBCONTRACTOR CLASSIFICATION By License Classification and/or Subclassification <i>(Completed by Owner)</i>	SUBCONTRACTOR'S PRIME CONTRACTOR'S NAME <i>(Must be completed by Bidder)</i>	SUBCONTRACTOR'S PRIME CONTRACTOR'S SC LICENSE NUMBER <i>(Requested, but not Required)</i>
BASE BID		

SE-330

LUMP SUM BID FORM

§ 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (*FOR INFORMATION ONLY*):

Pursuant to instructions in the Invitation for Construction Services, if any, Bidder will provide to Owner upon the Owner's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that this list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements of SC Code Ann § 11-35-3020(b)(i).

§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES

a) CONTRACT TIME

Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work within 180 Calendar Days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b) LIQUIDATED DAMAGES

Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the amount of \$ 250.00 for each Calendar Day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This amount is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

§ 10. AGREEMENTS

- a) Bidder agrees that this bid is subject to the requirements of the laws of the State of South Carolina.
- b) Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.
- c) Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.

§ 11. ELECTRONIC BID BOND

By signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal and Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, Bid Bond, included in the Bidding Documents.

ELECTRONIC BID BOND NUMBER: _____

SIGNATURE AND TITLE: _____

**SE-330
LUMP SUM BID FORM****CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATION****SC Contractor's License Number(s):** _____**Classification(s) & Limits:** _____**Subclassification(s) & Limits:** _____

By signing this Bid, the person signing reaffirms all representation and certification made by both the person signing and the Bidder, including without limitation, those appearing in Article 2 of the Instructions to Bidders, is expressly incorporated by reference.

BIDDER'S LEGAL NAME: _____**ADDRESS:** _____

TELEPHONE: _____**EMAIL:** _____**SIGNATURE:** _____ **DATE:** _____**PRINT NAME:** _____**TITLE:** _____

AIA[®] Document A101[™] – 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the _____ day of _____
in the year _____
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

MUSC
97 Jonathan Lucas Street
Charleston SC 29425

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201[™]-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

IoP Generator Replacement
67 Presidents Street, Charleston SC 29425

The Architect:
(Name, legal status, address and other information)

Engineer - Lee Metz, PE (Live Oak Consultants)
4214 Fellowship Road
North Charleston, SC 29418

The Owner and Contractor agree as follows.

Init.

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

§ 3.2 The Contract Time shall be measured from the date of commencement.

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§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than () days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of the Work

Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be

(\$ _____), subject to additions and deductions as provided in the Contract Documents.

Dollars

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

§ 4.3 Unit prices, if any:

(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item

Units and Limitations

Price per Unit (\$0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item

Price (\$0.00)

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the _____ day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the _____ day of the (same) (follomonth. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than _____ () days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of _____ percent (_____ %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™-2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of _____ percent (_____ %);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

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§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

- ☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2007
- ☐ Litigation in a court of competent jurisdiction
- ☐ Other: *(Specify)*

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

§ 8.3 The Owner's representative:
(Name, address and other information)

§ 8.4 The Contractor's representative:
(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

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§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages
---------	-------	------	-------

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date
--------	-------	------

§ 9.1.6 The Addenda, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

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ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of Insurance or Bond

Limit of Liability or Bond Amount (\$0.00)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)

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Insurance Cancellation Notice Requirements

In September of 2009, the Association for Cooperative Operations Research and Development (ACORD) amended its Form 25 Certificate of Liability Insurance (ACORD Form 25) as it relates an insurer's duty to give notice of cancellation of an insurance policy. The changes, and related rulings by state insurance administrative agencies, make it difficult or impossible for construction industry professionals to satisfy some requirements found in several AIA Contract Documents. Due to these developments, edits may be required to the standard text of the following AIA Contract Documents:

A107–2007	Sections 17.1 and 17.3.2
A141–2004 Exhibit A	Sections A9.10.2, A11.2.3 and A.11.4.6
A142–2004 Exhibit A	Section A9.10.2
A142–2004 Exhibit E	Section E.1.3
A201–2007	Sections 9.10.2, 11.1.3 and 11.3.6
A201–2007 SP	Sections 9.10.2, 11.1.3 and 11.3.6
A232–2009	Sections 9.10.2, 11.1.3 and 11.3.6
A232–2009 SP	Sections 9.10.2, 11.1.3 and 11.3.6
A251–2007	Section 13.1.3
A295–2008	Sections 10.2.2, 11.1.3 and 11.3.6
A401–2007	Section 13.3
A401–2007 SP	Section 13.3
A441–2008	Section 13.3
C101–1993	Section 9.3
C191–2009 Exhibit A	Sections A12.9.2 and A14.1.3
C196–2008	Section 2.4.5
C197–2008	Section 2.7.5
C198–2010	Section 2.9.3
C199–2010 Exhibit A	Sections A.5.26.2.2, A6.1.3 and A6.3.6

For more information, please visit AIA.org and read a memorandum entitled "Changes in the Insurance Industry Impact Notice of Policy Cancellation." This memorandum (1) provides an overview of the ACORD Form 25 changes and related rulings by state agencies, and (2) suggests edits that users might incorporate into standard AIA Contract Documents to respond to these changes and rulings.

To read the memorandum, visit the AIA Contract Documents Reference Material Web site, www.aia.org/contractdocs/reference. At the bottom of the **Reference Material** page, click **Other Reference Material**. On the Other Reference Material page, the memorandum is listed under the subheading "Corrections, Modifications and Important Information."

You may also access the memorandum by typing the following URL into your Web browser:

www.aia.org/groups/aia/documents/pdf/aiab101644.pdf

AIA[®] Document A201[™] – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

IoP Generator Replacement

67 Presidents Street, Charleston SC 29425

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

THE OWNER:

(Name, legal status and address)

MUSC

97 Jonathan Lucas Street

Charleston, SC 29425

THE ARCHITECT:

(Name, legal status and address)

Engineer - Lee Metz, PE (Live Oak Consultants)

4214 Fellowship Road

North Charleston SC 29418

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic’s lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner’s interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 CONCEALED OR UNKNOWN CONDITIONS

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents:

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled

to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce

other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term “Sub-subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor’s Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor’s Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor’s rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be

furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the

Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's

risk “all-risk” or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an “all-risk” or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect’s and Contractor’s services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner’s option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner’s property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner’s property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker.

Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

SE-355**PERFORMANCE BOND****KNOW ALL MEN BY THESE PRESENTS**, that *(Insert full name or legal title and address of Contractor)*

Name: _____

Address: _____

hereinafter referred to as "Contractor", and *(Insert full name and address of principal place of business of Surety)*

Name: _____

Address: _____

hereinafter called the "surety", are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: _____

Address: _____

hereinafter referred to as "Agency", or its successors or assigns, the sum of _____ (\$ _____), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Agency to constructState Project Name: IoP Generator ReplacementState Project Number: 9828-C

Brief Description of Awarded Work, as found on the SE-330 or SE-332, Bid Form: _____

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*Name: Engineering Consultant - Live Oak Consultants, LLCAddress: 4214 Fellowship RoadNorth Charleston, SC 29418

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this _____ **day of** _____, 2
(shall be no earlier than Date of Contract)

BOND NUMBER _____**CONTRACTOR**

By: _____
 (Seal)

Print Name: _____**Print Title:** _____**Witness:** _____**SURETY**

By: _____
 (Seal)

Print Name: _____

Print Title: _____
(Attach Power of Attorney)

Witness: _____*(Additional Signatures, if any, appear on attached page)*

SE-355**PERFORMANCE BOND****NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency for the full and faithful performance of the contract, which is incorporated herein by reference.
2. If the Contractor performs the contract, the Surety and the Contractor have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.
3. The Surety's obligation under this Bond shall arise after:
 - 3.1 The Agency has notified the Contractor and the Surety at the address described in paragraph 10 below, that the Agency is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If the Agency, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the Agency's right, if any, subsequently to declare a Contractor Default; or
 - 3.2 The Agency has declared a Contractor Default and formally terminated the Contractor's right to complete the Contract.
4. The Surety shall, within 15 days after receipt of notice of the Agency's declaration of a Contractor Default, and at the Surety's sole expense, take one of the following actions:
 - 4.1 Arrange for the Contractor, with consent of the Agency, to perform and complete the Contract; or
 - 4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Agency for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Agency and the contractor selected with the Agency's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the Agency the amount of damages as described in paragraph 7 in excess of the Balance of the Contract Sum incurred by the Agency resulting from the Contractor Default; or
 - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and:
 - 4.4.1 After investigation, determine the amount for which it may be liable to the Agency and, within 60 days of waiving its rights under this paragraph, tender payment thereof to the Agency; or
 - 4.4.2 Deny liability in whole or in part and notify the Agency, citing the reasons therefore.
5. Provided Surety has proceeded under paragraphs 4.1, 4.2, or 4.3, the Agency shall pay the Balance of the Contract Sum to either:
 - 5.1 Surety in accordance with the terms of the Contract; or
 - 5.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.
 - 5.3 The balance of the Contract Sum due either the Surety or another contractor shall be reduced by the amount of damages as described in paragraph 7.
6. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond 15 days after receipt of written notice from the Agency to the Surety demanding that the Surety perform its obligations under this Bond, and the Agency shall be entitled to enforce any remedy available to the Agency.
 - 6.1 If the Surety proceeds as provided in paragraph 4.4 and the Agency refuses the payment tendered or the Surety has denied liability, in whole or in part, then without further notice the Agency shall be entitled to enforce any remedy available to the Agency.
 - 6.2 Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the Dispute Resolution process defined in the Contract Documents and the laws of the State of South Carolina.
7. After the Agency has terminated the Contractor's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Agency shall be those of the Contractor under the Contract, and the responsibilities of the Agency to the Surety shall those of the Agency under the Contract. To a limit of the amount of this Bond, but subject to commitment by the Agency of the Balance of the Contract Sum to mitigation of costs and damages on the Contract, the Surety is obligated to the Agency without duplication for:
 - 7.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract; and
 - 7.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and
 - 7.3 Damages awarded pursuant to the Dispute Resolution Provisions of the Contract. Surety may join in any Dispute Resolution proceeding brought under the Contract and shall be bound by the results thereof; and
 - 7.4 Liquidated Damages, or if no Liquidated Damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. The Surety shall not be liable to the Agency or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Sum shall not be reduced or set-off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Agency or its heirs, executors, administrators, or successors.
9. The Surety hereby waives notice of any change, including changes of time, to the contract or to related subcontracts, purchase orders and other obligations.
10. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. Definitions
 - 11.1 Balance of the Contract Sum: The total amount payable by the Agency to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts to be received by the Agency in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
 - 11.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform the Contract or otherwise to comply with the terms of the Contract.

SE-357

LABOR & MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that *(Insert full name or legal title and address of Contractor)*

Name: _____
Address: _____

hereinafter referred to as “Contractor”, and *(Insert full name and address of principal place of business of Surety)*

Name: _____
Address: _____

hereinafter called the “surety”, are jointly and severally held and firmly bound unto *(Insert full name and address of Agency)*

Name: _____
Address: _____

hereinafter referred to as “Agency”, or its successors or assigns, the sum of _____ (\$ _____), being the sum of the Bond to which payment to be well and truly made, the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Agency to construct
State Project Name: IoP Generator Replacement
State Project Number: 9828-C
Brief Description of Awarded Work, as found on the SE-330 or SE-332, Bid Form: _____

in accordance with Drawings and Specifications prepared by *(Insert full name and address of A/E)*

Name: Engineering Consultant - Live Oak Consultants, LLC
Address: 4214 Fellowship Road
North Charleston, SC 29418

which agreement is by reference made a part hereof, and is hereinafter referred to as the Contract.

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms stated herein, do each cause this Labor & Material Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

DATED this _____ **day of** _____, **2** _____
(shall be no earlier than Date of Contract)

BOND NUMBER _____

CONTRACTOR

By: _____
(Seal)

Print Name: _____

Print Title: _____

Witness: _____

SURETY

By: _____
(Seal)

Print Name: _____

Print Title: _____
(Attach Power of Attorney)

Witness: _____

(Additional Signatures, if any, appear on attached page)

SE-357**LABOR & MATERIAL PAYMENT BOND****NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT:**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency to pay for all labor, materials and equipment required for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to the Agency, this obligation shall be null and void if the Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and
 - 2.2 Defends, indemnifies and holds harmless the Agency from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. With respect to Claimants, and subject to the provisions of Title 29, Chapter 5 and the provisions of §11-35-3030(2)(c) of the SC Code of Laws, as amended, the Surety's obligation under this Bond shall arise as follows:
 - 4.1 Every person who has furnished labor, material or rental equipment to the Contractor or its subcontractors for the work specified in the Contract, and who has not been paid in full therefore before the expiration of a period of ninety (90) days after the date on which the last of the labor was done or performed by him or material or rental equipment was furnished or supplied by him for which such claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of such suit and to prosecute such action for the sum or sums justly due him.
 - 4.2 A remote claimant shall have a right of action on the payment bond upon giving written notice by certified or registered mail to the Contractor within ninety (90) days from the date on which such person did or performed the last of the labor or furnished or supplied the last of the material or rental equipment upon which such claim is made.
 - 4.3 Every suit instituted upon a payment bond shall be brought in a court of competent jurisdiction for the county or circuit in which the construction contract was to be performed, but no such suit shall be commenced after the expiration of one year after the day on which the last of the labor was performed or material or rental equipment was supplied by the person bringing suit.
5. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
 - 5.1 Send an answer to the Claimant, with a copy to the Agency, within sixty (60) days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 5.2 Pay or arrange for payment of any undisputed amounts.
 - 5.3 The Surety's failure to discharge its obligations under this paragraph 5 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a claim. However, if the Surety fails to discharge its obligations under this paragraph 5, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs to recover any sums found to be due and owing to the Claimant.
6. Amounts owed by the Agency to the Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the Contractor furnishing and the Agency accepting this Bond, they agree that all funds earned by the contractor in the performance of the Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Agency's prior right to use the funds for the completion of the Work.
7. The Surety shall not be liable to the Agency, Claimants or others for obligations of the Contractor that are unrelated to the Contract. The Agency shall not be liable for payment of any costs or expenses of any claimant under this bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.
9. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the Agency or the contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
10. By the Contractor furnishing and the Agency accepting this Bond, they agree that this Bond has been furnished to comply with the statutory requirements of the South Carolina Code of Laws, as amended, and further, that any provision in this Bond conflicting with said statutory requirements shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.
11. Upon request of any person or entity appearing to be a potential beneficiary of this bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.
12. Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the laws of the State of South Carolina.

13. DEFINITIONS

- 13.1 Claimant: An individual or entity having a direct contract with the Contractor or with a Subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the Contractor and the Contractor's Subcontractors, and all other items for which a mechanic's lien might otherwise be asserted.
- 13.2 Remote Claimant: A person having a direct contractual relationship with a subcontractor of the Contractor or subcontractor, but no contractual relationship expressed or implied with the Contractor.
- 13.3 Contract: The agreement between the Agency and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

SECTION 01 05 50 - PROJECT PERMITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. The work outlined in this Section includes the providing of all labor, materials, and services as required by Federal, State, and local codes.

1.3 RULES AND REGULATIONS

- A. All contractors, subcontractors, and bidders providing services related to the environment shall be held responsible for a level of competency with respect to the regulatory requirements within their area of expertise.
- B. It shall be contingent on the Contractor and all Subcontractors to adhere to all such legal requirements as mandated by the law, the permits, and/or the requirements of the applicable agencies. Further, it is contingent on the subcontract bidders to be aware of the requirements normally mandated by the approval agencies listed hereinafter and in turn, to provide a bid price sufficient to include all special requirements that could be required by the permitting agencies.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PROJECT PERMITS

- A. The Contractor shall not begin construction of any portion of the general site water or stormwater system prior to receipt of all federal, state, and local construction permits as indicated in this section.
- B. The Contractor shall be required to adhere to all requirements of the permits. Included in adherence thereto is compliance with all conditions of the permit as well as requirements implied in the laws, ordinances, and regulations. These shall include but not be limited to material and construction standards, environmental protection, certifications, notifications, and special conferences. Required permit applications shall be made by the Engineer to AHJ agencies. Any other required permits shall be the responsibility of the Contractor.

3.2 PERMIT POSTING

- A. The Owner shall make available to the Contractor upon issuance of the Notice to Proceed copies of all permits with conditions related thereto. The Contractor shall post on a weatherproof display board all actual permits and keep, suitably accessible for use by the Owner and representatives of the approval agencies, the actual permits and related materials such as drawings.

3.3 CONTRACTOR-FURNISHED SYSTEMS

- A. Certain systems in the project, such as the lift station, are to be furnished in compliance with the designs indicated. The designs indicated are not intended to be proprietary. It is contingent on the bidders marketing such systems in the State of South Carolina and the Contractors installing such systems to provide systems that are acceptable to the local utility authority as well as to the governmental agencies who approve the design shop drawings and accept the "As-Built" condition of the systems. If anytime during the construction process some portions of the systems prove to be unacceptable to the governmental agencies or the local utility authority, the systems shall be modified, corrected, or replaced until they are made acceptable. It shall be contingent on the Design-Builder to propose only on systems that are acceptable to the local utility authority and the applicable governmental agencies.
- B. The water and stormwater systems shall not be put into operation for purposes other than testing for leaks and system functions prior to receipt of all required federal, state, and local agency clearance and operating permits.

3.4 FINAL CERTIFICATION

- A. The Builder will provide to the Designer markup drawings, prepared by the Contractor and confirmed by a surveyor licensed in the State of South Carolina, on all systems covered by the permits and the wastewater system a minimum of sixty (60) days prior to building occupancy to allow for the Designer to obtain the required final "As-Built/Record" acceptance, certification, and/or operating permits. In most cases including the water and stormwater facilities, said agency acceptance will be required prior to occupancy of the facility or use of any part of the systems. The Contractor shall be advised that the use of unaccepted systems such as potable water systems, sanitary sewer systems, and those systems that would affect the health and safety of the employees of the Contractor, the Owner, or the public at large shall be at the risk of the Contractor. The Contractor shall use care in controlling and regulating the use of such systems. Any fines levied by the permitting agencies as the result of operating systems prior to agency acceptance shall be paid by the Contractor at no additional cost to the Owner.
- B. The Contractor shall submit the following information to the Designer:
 - 1. Potable Water System:
 - a. As-built/record drawings of the water distribution system, prepared and signed and sealed by a surveyor licensed in the State of South Carolina.

- b. Satisfactory bacteriological results on the water distribution system along with a plan indicating the location of the sampling.
 - 2. Wastewater Collection/Transmission System:
 - a. As-Built/Record drawings of the wastewater collection/transmission system, including lift station, prepared and signed and sealed by a surveyor licensed in the State of South Carolina.
 - b. Operation and Maintenance Manual.
 - c. Letter certifying acceptable force main pressure testing.
 - 3. Stormwater System:
 - a. As-built/record drawings of stormwater facilities, prepared and signed and sealed by a surveyor licensed in the State of South Carolina.
- C. The Contractor's project responsibility shall extend to the final acceptance and issuance of operating permits by the approval agencies or authorities and in some cases could extend the time frame beyond that for final project acceptance.

3.5 SYSTEM SUBSTITUTIONS SUBSEQUENT TO PERMITTING

- A. If the Builder proposes to substitute a system for use other than that detailed and permitted by the Designer, he shall provide the Owner's Representative with all necessary supportive data required to file for any required modification to the approved permit.

3.6 CONFERENCES

- A. The Contractor shall be aware of the requirements of the various local and state agencies that could require their attendance at a special agency or authority pre-construction conference. The Contractor shall set up all such meetings as required with attendance by a representative of the Owner.

3.7 MAINTENANCE OF TRAFFIC

- A. The Contractor shall be responsible for all around-the-clock maintenance of traffic both on the site, as well as the adjoining roadways, as he affects such activities. This shall conform to all the applicable requirements of the Charleston Aviation Authority, the City of North Charleston, and the State of South Carolina Department of Transportation (SCDOT). The Contractor shall submit a maintenance of traffic (MOT) plan to the Owner's Representative a minimum of forty-eight (48) hours in advance of work. The Contractor shall make all arrangements for inspection, layout, and safety review of the MOT in accordance with local, County and SCDOT requirements as applicable.

3.8 SUBMITTALS AND TESTING

- A. The Contractor shall provide all necessary submittals such as shop drawings and test reports as may be required by the utility authorities or permitting agencies.

3.9 "AS-BUILT/RECORD" DRAWINGS

- A. The Contractor shall provide upon completion of the work or portions thereof, "As-Built/Record" drawings prepared by a surveyor licensed in the State of South Carolina, as required by and acceptable to all permitting agencies. Agencies require submittal from the Designer of certified "As-Built/Record" drawings prior to placement of systems into service.
- B. The Contractor shall provide all layout using a surveyor licensed in the State of South Carolina. Following construction this same surveyor shall resurvey the final construction as part of the site wide final as built survey. The Contractor shall check this final as built, make all necessary field changes, resurvey the affected areas, and submit the survey to the Designer in separate submittals as required for the final certification to the applicable governmental agencies.

3.10 SURFACE WATER QUALITY

- A. Beside full adherence to the requirements of the Department of Health and Environmental Conservation, the Contractor shall not discharge any stormwater runoff from the construction process off the project site. In the event that stormwater runoff from construction activities discharges off site, the Design-Builder shall be responsible for obtaining any permits required from EPA and paying any fines associated with non-compliance.

END OF SECTION 01 05 50

SECTION 01 10 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Work under separate contracts.
5. Future work.
6. Purchase contracts.
7. Contractor-furnished, Owner-installed products.
8. Access to site.
9. Coordination with occupants.
10. Work restrictions.
11. Specification and drawing conventions.
12. Miscellaneous provisions.

- B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: MUSC, Institute of Psychiatry (IOP) Generator Replacement

1. Project Location: MUSC, Institute of Psychiatry (IOP), 67 President St, Charleston, SC 29425

- B. Owner: MUSC Engineering & Facilities

1. Owner's Representative: Phil Mauney

- C. Engineer: Jimmy Stewart

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The project will include the replacement of two (2) rooftop generators (one 500KW and one 400KW) with one (1) 800KW diesel generator. The new generator will be installed in same general area that the two existing generators are to be removed from while re-utilizing some of the existing steel structure and electrical cabling.

B. Type of Contract:

1. Project will be constructed under a single prime contract.
 - a. MUSC IOP Generator Replacement

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 FUTURE WORK (not used)

1.8 PURCHASE CONTRACTS

A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.

1. Contractor's responsibilities are same as if Contractor had negotiated purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.

1.9 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

- A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning them over to Owner at Project closeout.

1.10 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas as shown on drawings indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to areas as shown on contract drawings.
 - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.11 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Engineer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.

3. Before limited Owner occupancy, electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.12 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the facility to normal business working hours of 6:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Engineer and Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Engineer's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Engineer not less than two days in advance of proposed disruptive operations.
 2. Obtain Engineer's written permission before proceeding with disruptive operations.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- F. Employee Identification: Provide identification Employee Roster Badges for Contractor personnel working on Project site. Only employees & subcontractors with approved MUSC identification badges are allowed on the job site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

1.13 SPECIFICATION AND DRAWING CONVENTIONS

- A. 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. Imperative mood and streamlined language are generally used in the Specifications. 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.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.14 MISCELLANEOUS PROVISIONS

- A. See Special Provisions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after identification of the Project Work Order.

1.2 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Project Work Order.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Project Work Order and proposed by the Contractor after identification of the Project Work Order are considered to be requests for substitutions.
- C. The following are not considered to be requests for substitutions and are not subject to the provisions of this Section:
 - 1. Revisions to the Scope of Work requested by the Owner or Engineer and issued to the Contractor(s) via Bulletin.
 - 2. Specified options of products and construction methods included in the Project Work Order.

1.3 SUBMITTALS

- A. Substitution Request Submittal: Format for submittal of Substitution Requests is to be as follows:
 - 1. Submit each request for substitution for consideration by the Engineer and the Board. Use attached Form at end of this Section.
 - 2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
 - 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

- a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Board and separate Contractors that will be necessary to accommodate the proposed substitution.
- b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
- c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
- d. Samples, where applicable or requested.
- e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. The proposed substitution shall not extend the Job Order Time.
- f. Cost information, including a Price Proposal of the net change in the Job Order Amount (if any), submitted in the format required for Change Order requests.
- g. The Contractor's certification that the proposed substitution conforms to requirements in the Project Work Order in every respect and is appropriate for the applications indicated.
- h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

1.4 CONSIDERATION

- A. Requests for substitution may, at the discretion of the Engineer, either be considered or may be rejected without consideration.
- B. There shall be no time extensions granted due to time required for completion of the Substitution process either successfully or unsuccessfully.
- C. Conditions: The Engineer will receive and consider the Contractor's request for substitution if all of the following conditions are satisfied, as determined by the Engineer. If the following conditions are not satisfied, the Engineer will return the requests without action except to record noncompliance with these requirements:
 1. The reason for proposing the Substitution is one of the following:
 - a. The specified product or method of construction is no longer available.
 - b. There is no condition under which the specified product or method of construction can be installed as shown on the Project Work Order.
 - c. There is no condition under which the specified product or method of construction can be provided within the Job Order Time.

2. Extensive revisions to the Project Work Order are not required.
 3. Proposed changes are in keeping with the general intent of the Project Work Order.
 4. The request is timely, fully documented, and properly submitted.
- D. The Contractor's submittal and the Engineer's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Project Work Order do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

1.5 ENGINEERS ACTION

- A. Engineer's Action: If necessary, the Engineer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Engineer will notify the Contractor of acceptance or rejection of the substitution within fourteen (14) days of receipt of the request, or seven (7) days of receipt of additional information or documentation, whichever is later.
1. Use the product specified if the Engineer cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SUBSTITUTION REQUEST FORM

- A. A two page Substitution Request Form follows this page.

END OF SECTION

[PROJECT NAME]

TO: [INSERT NAME OF ENGINEER]
[ADDRESS]
[CITY, SC ZIP CODE]

CC: [BOARD AUTHORIZED REPRESENTATIVE]

INSTALLER: _____ PHONE: _____
Name of Subcontractor

ADDRESS: _____

1. Specification Section: _____ Paragraph: _____

2. Reason for Substitution:

3. Proposed Substitute:

A. Name and Model No. _____

B. Manufacturer: _____

ADDRESS: _____

Phone Number and Person to Contact: _____

C. Attach applicable performance and test data.

D. Numbers of applicable reference standards: _____

E. Attach a color chart, if applicable.

F. Attach installation instructions.

4. Manufacturer's Reputation: Attach evidence of manufacturer qualifications and reputation for prompt delivery and efficiency in servicing products, as applicable.

Comparison: Attach an itemized comparison of the proposed substitution with product specified, including test performance data.

6. Changes in Work: Attach data relating to changes required in other work to permit use of proposed substitution and changes required in construction schedule.
7. Previous Installations: Attach list of not less than five (5) similar projects, in the Chicago area, on which proposed substitution was used. List name and address of project, date of installation, and name, address, and phone number of Engineer.
8. Cost Data: Attach accurate cost data on proposed substitution in comparison with product specified.
9. In making request for substitution, Contractor represents that:
 - a. It has examined the Project Work Order and has determined that, to the best of its knowledge, the proposed substitution is appropriate for the use intended in the Project Work Order, and shall perform as well as or better than the specified product.
 - b. It shall provide the same warranties for substitution as for product specified.
 - c. It shall coordinate installation of accepted substitution into the Work, making such changes as may be required for Work to be complete in all respects.
 - d. It waives all claims for additional costs related to substitutions that consequently become apparent.
 - e. Cost data is complete and includes all related costs under its Contract.

Name of Manufacturer

Signature of Manufacturer's Representative

Date

Name of Installer

Signature of Installer's Representative

Date

Name of General Contractor

Signature of General Contractor's Representative

Date

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Engineer will issue [through Construction Manager] supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Engineer's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: [Engineer] [Construction Manager] will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by [Engineer] [Construction Manager] are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 14 days, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

- c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to [Engineer] [Construction Manager].
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use AIA Document G709 for Proposal Request.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, [Engineer] [Construction Manager] will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: [Engineer] [Construction Manager] may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule [Cost-loaded CPM Schedule may serve to satisfy requirements for the Schedule of Values.]
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.

- c. Contractor's Construction Schedule.
 2. Submit the Schedule of Values to Architect [through Construction Manager] at earliest possible date but no later than [seven] <Insert number> days before the date scheduled for submittal of initial Applications for Payment.
 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Submit draft of [AIA Document G703 Continuation Sheets] [EJCDC Document 1910-8-E] <Insert name and designation of other standard form>.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. [Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.]
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect **[and Construction Manager]** and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Architect by the **<Insert day>** of the month. The period covered by each Application for Payment is one month, ending on the **[last day of the month] <Insert specific day of the month>**.
- D. Payment Application Forms: Use **[AIA Document G702 and AIA Document G703 Continuation Sheets] [AIA Document G702/CMA and AIA Document G703 Continuation Sheets] [EJCDC Document 1910-8-E] <Insert name and designation of other standard form>** as form for Applications for Payment.

- E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. **[Architect]** **[Construction Manager]** will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- G. Transmittal: Submit **[3]** **<Insert number>** signed and notarized original copies of each Application for Payment to **[Architect]** **[Construction Manager]** by a method ensuring receipt **[within 24 hours]**. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
- K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 29 73 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Submit to ENGINEER for acceptance a Schedule of Values that allocates cost to each item of the Work. Schedule of Value list of line items shall correspond to each aspect of the Work establishing in detail the portion of the Guaranteed Maximum Price (GMP) allocated to each major component of the Work.
- B. Upon request of ENGINEER, support values with data that substantiate their correctness.
- C. Submit preliminary Schedule of Values to ENGINEER for initial review. CONTRACTOR shall incorporate ENGINEER's comments into the Schedule of Values and resubmit to ENGINEER. ENGINEER may require corrections and resubmittals until Schedule of Values is acceptable.
- D. Schedule of Values and the Progress Schedule updates specified in Section 01 32 16, Progress Schedule, shall be basis for preparing each Application for Payment. Schedule of Values may be used as a basis for negotiating price of changes, if any, in the Work. The Work Breakdown Structure (WBS) for the Progress Schedule and the WBS for the Schedule of Values should match as closely as possible to allow the CONTRACTOR to cost load the Progress Schedule if mutually agreed to by ENGINEER and OWNER to facilitate use of the Progress Schedule Updates as a means of preparing applications for payment.
- E. Schedule of Values itemized list of Work shall be grouped under the following areas:
 - 1. Demo existing generators
 - 2. Install new structural steel
 - 3. Install new generator
 - 4. Complete electrical connections
 - 5. Complete fuel connections
- F. Requirements for preliminary Schedule of Values and Schedule of Values are:
 - 1. Schedule of Values shall show division of Work between CONTRACTOR and Subcontractors (Trade Contractors). Line items for Work to be done by Subcontractor shall include the word, "(SUBCONTRACTED)".
 - 2. Schedule of Values shall include breakdown of costs for materials and equipment, installation, and other costs used in preparing the Bid by CONTRACTOR and each Subcontractor. List purchase and delivery costs for materials and equipment for which CONTRACTOR may apply for payment as stored materials.
 - 3. Include separate amounts for:
 - a. CM/GC's Pre-Construction Fee for services,
 - b. CM/GC Construction Fee (Profit),

- c. CM/GC Construction Phase Overhead Costs and Expenses (General Conditions and Administrative Costs),
 - d. Estimated Cost of the Work, including Allowances
 - e. CM/GC's Construction Contingency Cost
4. For each of the three major parts of the Contract described above, include a breakdown of the work by each Specification Section in the Contract Documents and identifying the Cash Allowance(s) and breakdown of the Cash Allowance(s) in separate line items.
 5. Identify each line item with number corresponding to the associated Specification Section number. List sub-items of major products or systems, as appropriate or when requested by ENGINEER.
 6. Sum of individual values shown on the Schedule of Values shall equal the total of the GMP.
 7. Include line items for proposed payments for approved shop drawing submittals for selected equipment as mutually agreed between CONTRACTOR and ENGINEER,
 8. Include line items, in amounts mutually agreeable between CONTRACTOR and ENGINEER, for approved Preliminary Operation and Maintenance Data submittals, completed Instruction of Operation and Maintenance Personnel and for completed acceptance testing for all materials, equipment, facilities and systems for which these approved submittals and completed performance requirements are required by the Contract Documents.
 9. Include line items for proposed subcontractor mobilization as mutually agreed between CONTRACTOR and ENGINEER.
 10. Prepare and submit Schedule of Values set up for 8.5-inch by 11-inch paper format.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Submit to ENGINEER one electronic copy of Schedule of Values.
2. Content of Schedule of Values submittals shall conform to Article 1.1 of this Section.
3. Time Frames for Submittals:
 - a. Submit preliminary Schedule of Values as soon as practical but no later than ten days following the date that the Contract Times commence running in accordance with the Notice to Proceed.
 - b. Submittal of the Schedule of Values shall be in accordance with the General Conditions. ENGINEER and OWNER will not accept Applications for Payment without an acceptable Schedule of Values.
 - c. When required by ENGINEER, promptly submit updated Schedule of Values to include cost breakdowns for changes in GMP.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 29 73

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
 - 1. Division 01 Section "Multiple Contract Summary" for a description of the division of Work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 3. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit **[two]** **<Insert number>** opaque copies of each submittal. Architect[, **through Construction Manager,**] will return **[one copy]** **<Insert number> copies**.
 - a. Submit **[five]** **<Insert number>** copies where Coordination Drawings are required for operation and maintenance manuals. Architect[**and Construction Manager**] will retain **[two]** **<Insert number>** copies; remainder will be returned.[**Mark up and retain one returned copy as a Project Record Drawing.**]
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within **[15]** **<Insert number>** days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within **[three] <Insert number>** days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner [, **Construction Manager,**] and Architect, but no later than **[15] <Insert number>** days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, [**Construction Manager,**] Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.

- h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. LEED requirements.
 - l. Preparation of Record Documents.
 - m. Use of the premises [**and existing building**].
 - n. Work restrictions.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Construction waste management and recycling.
 - r. Parking availability.
 - s. Office, work, and storage areas.
 - t. Equipment deliveries and priorities.
 - u. First aid.
 - v. Security.
 - w. Progress cleaning.
 - x. Working hours.
 - 3. Minutes: [**Architect will record**] [**Record**] and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect [**and Construction Manager**] of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.

- r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at **[weekly] [biweekly] [monthly] [regular] <Insert appropriate interval>** intervals. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner [**Construction Manager,**] and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.

- 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: **[Architect will record and distribute to Contractor]** **[Record]** the meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Conduct Project coordination meetings at **[weekly]** **[biweekly]** **[monthly]** **[regular]** **<Insert appropriate interval>** intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner **[Construction Manager,]** and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss

- whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Contractor.
 - 4. Name of Architect [**and Construction Manager**].
 - 5. RFI number, numbered sequentially.
 - 6. Specification Section number and title and related paragraphs, as appropriate.
 - 7. Drawing number and detail references, as appropriate.

8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: **[CSI Form 13.2A] [Form at end of this Section]**.
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's **[and Construction Manager's]** Action: Architect **[and Construction Manager]** will review each RFI, determine action required, and return it. Allow **[seven]** **<Insert number>** working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect **[and Construction Manager]** in writing within **[10]** **<Insert number>** days of receipt of the RFI response.

- F. On receipt of Architect's [**and Construction Manager's**] action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect [**and Construction Manager**] within [**seven**] <Insert number> days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log [**weekly**] <Insert time>. [**Use CSI Log Form 13.2B.**] [**Include the following:**] [**Software log with not less than the following:**]
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect [**and Construction Manager**].
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's [**and Construction Manager's**] response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 31 19 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Pre-Construction Conference
 - 2. Pre-Installation Conference
 - 3. Coordination Meetings
 - 4. Progress Meetings
- B. Construction schedules are specified in Section 01 33 00 - Submittal Procedures.

1.3 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference and organizational meeting at the project site or other convenient location no later than 20 days after execution of the agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

- B. Attendees: The County's Representative, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with project and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule
 - 2. Phasing.
 - 3. Critical Work sequencing and/coordinating
 - 4. Designation of responsible personnel and their duties.
 - 5. Procedures for processing field decisions and Change Orders
 - 6. Procedures for RFIs.
 - 7. Procedures for testing and inspecting. Procedures for processing Applications for Payment
 - 8. Distribution of Contract Documents
 - 9. Submittal of Shop Drawings, Product Data and Samples
 - 10. Preparation of record documents
 - 11. Use of the Premises
 - 12. Work restrictions.
 - 13. Owner's occupancy requirements.
 - 14. Responsibility for temporary facilities and controls.
 - 15. Office, Work and storage areas
 - 16. Equipment deliveries and priorities
 - 17. Safety procedures
 - 18. First aid
 - 19. Security
 - 20. Housekeeping: Construction waste management and recycling. Progress cleaning.
 - 21. Working hours
 - 22. Parking availability.
- D. Contractor must submit at the time of the meeting at least the following items:
 - 1. Schedule of Values

2. Listing of key personnel including project superintendent and subcontractors with their addresses, telephone numbers, and emergency telephone numbers.
3. Preliminary Construction Schedule
4. Submittal Schedule

1.4 PRE-INSTALLATION CONFERENCE

- A. Conduct a Pre-installation conference at the site before each construction activity that requires coordination with other construction. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise at least 48 hours in advance the Project Manager of scheduled meeting dates.
- B. Agenda: Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 1. Contract Documents
 2. Options
 3. Related Change Orders
 4. Purchases
 5. Deliveries
 6. Submittals
 7. Review of mockups
 8. Shop Drawings, Product Data and Quality Control Samples
 9. Possible conflicts
 10. Compatibility problems
 11. Time schedules
 12. Weather limitations
 13. Manufacturer's recommendations
 14. Comparability of materials
 15. Acceptability of substrates
 16. Temporary facilities and controls
 17. Space and access limitations

18. Governing regulations. Regulations of authorities having jurisdiction
 19. Safety
 20. Inspection and testing requirements
 21. Installation procedures.
 22. Coordination with other work.
 23. Required performance results
 24. Recording requirements
 25. Protection of adjacent work.
 26. Protection of construction and personnel.
- C. Record significant discussions and agreements and disagreements of each conference along with and approved schedule including required corrective measures and actions.
- D. Reporting: Distribute the record of the meeting to everyone concerned promptly including the Owner and Engineer.
- E. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 COORDINATION MEETINGS

- A. Conduct project coordination meeting at weekly intervals on day and time as established by the Project Manager or more frequently, if necessary convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved, to include subcontractors and representatives.
- C. Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project site at bimonthly (weekly) intervals or more frequently if necessary as directed by the Project Manager. Notify the Owner at least 48 hours in advance of scheduled meeting time and dates. Coordinate dates of meetings with preparation of the payment request.

- B. Attendees: In addition to representatives of the Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress of involved in planning, coordination or performance of future activities with the project shall be represented at this meeting and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time, ahead, or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time. Review the schedule for next period.
 - 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements
 - b. Time
 - c. Sequences of operations.
 - d. Deliveries
 - e. Off-site fabrication problems
 - f. Access
 - g. Site utilization
 - h. Temporary facilities and services
 - i. Hours of work
 - j. Hazards and risks
 - k. Housekeeping Progress cleaning
 - l. Quality and work standards
 - m. Change Orders Status
 - n. Documentation of information for payment requests.
 - o. Status of submittals
 - p. Status of correction of deficient items.
 - q. Field observations
 - r. RFIs
 - s. Status of proposal request.
 - t. Pending changes.
 - u. Pending claims and disputes
 - 3. Minutes: Record the meeting minutes.
- D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, or progress since the previous meeting and report.
 - 1. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 19

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Special reports.
- B. Related Sections include the following:
 - 1. Division 01 Section "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
 - 2. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
 - 3. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 4. Division 01 Section "Photographic Documentation" for submitting construction photographs.
 - 5. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 6. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 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: An activity that precedes another activity in the network.

- 3. Successor Activity: An activity that follows another activity in the network.
 - B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
 - C. 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.
 - D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
 - E. Event: The starting or ending point of an activity.
 - F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time **[belongs to Owner] [is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed 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 successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
 - G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
 - H. Major Area: A story of construction, a separate building, or a similar significant construction element.
 - I. Milestone: A key or critical point in time for reference or measurement.
 - J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
 - K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.
- 1.4 SUBMITTALS
- A. Qualification Data: For scheduling consultant.
 - B. Submittals Schedule: Submit **[three] <Insert number>** 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 **[and Construction Manager's]** final release or approval.
- C. Preliminary Construction Schedule: Submit **[two]** **<Insert number>** opaque copies.
1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.
- D. Preliminary Network Diagram: Submit **[two]** **<Insert number>** opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.
- E. Contractor's Construction Schedule: Submit **[two]** **<Insert number>** opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- F. CPM Reports: Concurrent with CPM schedule, submit **[three]** **<Insert number>** copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from **[commencement of the Work]** **[the Notice to Proceed]** until most recent Application for Payment.
- G. Daily Construction Reports: Submit **[two]** **<Insert number>** copies at **[weekly]** **[monthly]** intervals.
- H. Material Location Reports: Submit **[two]** **<Insert number>** copies at **[weekly]** **[monthly]** intervals.
- I. Field Condition Reports: Submit **[two]** **<Insert number>** copies at time of discovery of differing conditions.

- J. Special Reports: Submit **[two]** **<Insert number>** copies at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including **[phasing]** **[work stages]** **[area separations]** **[interim milestones]** **[and]** **[partial Owner occupancy]**.
 4. Review delivery dates for Owner-furnished products.
 5. Review schedule for work of Owner's separate contracts.
 6. Review time required for review of submittals and resubmittals.
 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 8. Review time required for completion and startup procedures.
 9. Review and finalize list of construction activities to be included in schedule.
 10. Review submittal requirements and procedures.
 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 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.
1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary **[bar-chart schedule]** **[network diagram]**. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for **[commencement of the Work]** **[the Notice of Award]** **[the Notice to Proceed]** to date of **[Substantial]** **[Final]** Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than **[20]** **<Insert number>** days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. **<Insert list of major items or pieces of equipment.>**

3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than **<Insert number>** days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's **[and Construction Manager's]** administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.

- j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
- 8. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- 9. Other Constraints: **<Insert additional constraints not indicated elsewhere.>**
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion[.] [, **and the following interim milestones:**]
 - 1. **<Insert additional milestones not indicated elsewhere.>**
- F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 - 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
 - 2. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - 3. Each activity cost shall reflect an accurate value subject to approval by Architect.
 - 4. Total cost assigned to activities shall equal the total Contract Sum.
- G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
 - 1. **<Insert name of specific software>**, Version **<Insert designation>**, for
[Windows 98] **[Windows NT]** **[Windows ME]** **[Windows 2000]**

[Macintosh OS7.x] [Macintosh OS8.x] [Macintosh OS9.x] [Macintosh OS X]
operating system.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within **[seven]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first **[60]** <Insert number> days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within **[30]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in **[10]** <Insert number> percent increments within time bar.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Preliminary Network Diagram: Submit diagram within **[14]** <Insert number> days of date established for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**. Outline significant construction activities for the first **[60]** <Insert number> 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 computerized **[cost- and resource-loaded,]** time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than **[30]** <Insert number> days after date established

for **[commencement of the Work]** **[the Notice to Proceed]** **[the Notice of Award]**.

- a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.
- 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. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing **[and commissioning]**.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the Schedule of Values).
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts **[one week]** **<Insert time>** before each regularly scheduled progress meeting.

2.6 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. **[Construction] [Work]** Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial Completions and occupancies.
 19. Substantial Completions authorized.
- B. Material Location Reports: At **[weekly] [monthly]** intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation **[on CSI Form 13.2A]**. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.7 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within **[one] <Insert number>** day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At **[monthly]** **<Insert time>** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **[one week]** **<Insert time>** before each regularly scheduled progress meeting.
 - 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.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect **[Construction Manager,]** 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 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparation, submission, updating, and reporting of Contractor's construction schedule.

1.2 DEFINITIONS

- A. Activity: A discrete part (task or event) of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule have a definable start and stop and consume time and resources, such as people, materials, or facilities. Each activity shall be assigned a unique alphanumeric identification code (Activity ID).
 - 1. Controlling Activity: The first incomplete activity on the critical path.
 - 2. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times, and that contains zero or less total float.
 - 3. Predecessor Activity: An activity that precedes another activity in the network and may require completion prior to the start of a successor activity. A predecessor activity may control the start or finish of a successor activity.
 - 4. Successor Activity: An activity that follows another activity in the network. The start or finish of a successor activity may be controlled by the predecessor activity.
- B. Completion Date, Contract: The date specified in the Contract Documents for completion of the Work, or a revised date resulting from approved extensions of the Contract Time.
- C. Completion Date, Scheduled: The date projected or forecasted by the project schedule.
- D. Constraint: A factor or restriction imposed on, and that controls, an activity's start or finish date, regardless of other logic that may be applied to the activity.
- E. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved in writing by the Board Authorized Representative.
- F. Critical Path: The path (sequence) of activities that represent the minimum time required to complete the project and contains no float. A delay in any activity in the critical path will cause a delay in the completion of the project.
- G. Critical Path Method (CPM) Scheduling: A method of planning and scheduling a construction project that breaks the project down into activities that are arranged in a logical sequence, based on activity relationships, to determine the overall schedule and time required to successfully complete the project. CPM scheduling focuses attention

on the critical path of activities that affect the completion date, or interim milestones, for the project.

- H. Date, Data: The date to use as the starting point for schedule calculations. The data date shall be changed to the specified date when recording progress.
- I. Date, Early: The earliest date an activity can start or finish.
- J. Date, Late: The latest date an activity can start or finish without affecting successor activities, interim milestone date(s), and/or the project completion date.
- K. Duration: The estimated time needed to perform an activity or project.
- L. Float: The amount of time that an activity can be delayed without delaying the rest of the project and/or the project completion date. Float (also known as "Total Float") is owned by the project, is not for the exclusive use by or the benefit of the Board or the Contractor, and is therefore a resource available to both the Board and the Contractor on a first needed basis.
 - 1. Extensions of Contract Time shall not be granted unless the accepted delay affects the critical path, all available float has been used, and a time impact analysis has been performed.
- M. Free Float: The amount of time an activity can be delayed without delaying the early start of any successor activities.
- N. Gantt Chart: A graphic representation of a project schedule, with bars arranged in a chronological order, without relationships shown, and project calendar days shown along the horizontal axis.
- O. Logic Relationship: A dependency between two project activities.
- P. Milestone: An activity with zero duration that represents a clearly identifiable and significant point in the project.
- Q. Network Diagram: A graphic diagram of a CPM schedule, showing activities and the relationships among activities.
- R. Open End: The condition that exists when an activity has either no predecessor or no successor, or when an activity's only predecessor relationship is a finish-to-finish relationship or an activity's only successor relationship is a start-to-start relationship.
- S. Recovery Schedule: A revised critical path analysis and CPM schedule that demonstrates how the Contractor will recover the progress of Work that has fallen behind schedule in order to meet the approved milestone dates.
- T. Relationships: The interdependence among activities, linking activities to predecessors and successors.

- U. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled, or the identification of subcontractor performing the Work.
- V. Schedule: A set of activities, organized by relationships, that depict the plan for execution of the Project.
 - 1. Baseline Schedule: The approved plan for a project, against which construction progress is compared and deviations are measured. The baseline schedule may include dates related to interim milestones, completion of project phase(s), and other aspects of the Project.
 - 2. Initial Schedule: Schedule showing the proposed initial plan for the Project.
 - 3. Bi-Weekly Updated Schedule: Schedule incorporating the Project's actual progress every two weeks during summer construction period.
 - 4. Monthly Updated Schedule: Schedule incorporating the Project's actual progress every month during non-summer construction period.
 - 5. Revised Schedule: Schedule prepared and submitted by the Contractor that includes significant changes to the Contractor's plan and schedule.
 - 6. Final Schedule: The last schedule update, containing the actual start and finish dates for every activity in the project schedule. The Contractor must certify the final schedule's accuracy.

1.3 SUBMITTALS

- A. Schedule Narrative: Submit a written narrative with the construction schedules, including updates, as indicated.
- B. Contractor's Construction Schedule: Using the Board's scheduling software, submit the following:
 - 1. Baseline Schedule: Submit an electronic copy of the baseline schedule, showing the entire construction period, within the timeframe specified.
 - 2. Updated Schedule: Submit updates to the construction schedule at required intervals.
 - 3. Revised Schedule: Submit revised schedules as required or as requested by the Board Authorized Representative.
- C. Qualifications: Submit qualifications for project scheduler not less than seven (7) days **prior to** Notice of Award (NOA). Include resume, years of experience, certifications, licenses, and examples of prepared schedules.
 - 1. The Board Authorized Representative will approve or reject the project scheduler proposed by the Contractor and will notify the Contractor in writing of their approval or rejection within four (4) days of receipt of the required documentation.
 - a. If rejected by the Board Authorized Representative, the Contractor shall submit documentation for a replacement project scheduler within three (3) days of receipt of written notice of rejection.
 - b. This procedure shall be followed until a project scheduler is approved by the Board Authorized Representative.
 - 2. The project scheduler must be approved by the Board Authorized Representative prior to Notice of Award (NOA).

1.4 QUALITY ASSURANCE

- A. Qualifications – Project Scheduler: Employ an experienced project scheduler, skilled in the application of network techniques for construction projects, with not less than three (3) years' experience in CPM scheduling and reporting, including experience in the creation and maintenance of CPM construction project schedules utilizing the specified software on not less than three (3) projects of comparable scale and complexity to this Project. If skilled personnel are not employed, engage the services of a consultant with the same experience and capabilities to provide planning, evaluation, and reporting of the CPM schedule for the duration of the Project.
1. The project scheduler shall be responsible for development of the project schedule, implementing required updates and requested changes to the schedule, and maintenance of the project schedule.
 2. The project scheduler shall cooperate with the Board Authorized Representative, be on the project site periodically, and attend all meetings related to Project progress, alleged delays, and time impacts as required to accurately modify and update the construction project schedule.
 3. Upon approval by the Board Authorized Representative, the project scheduler shall be maintained throughout the Project and shall not be replaced without written approval from the Board Authorized Representative.
 4. Should the project scheduler voluntarily leave the Contractor's staff, the Contractor shall submit to the Board a resume and qualifications for a replacement project scheduler within five (5) days.
 5. The Board reserves the right to reject project scheduling staff or consultant(s) proposed by the Contractor.
 6. The Board reserves the right to request replacement of the project scheduler at any point during the Project should the project schedule, in the opinion of the Board, not meet the degree of detail described in the Contract Documents.
- B. Project Scheduling Conference: Prior to submission of baseline schedule, coordinate a project scheduling conference with the Board Authorized Representative and Architect to review methods and procedures related to the construction schedule including, but not limited to, the following:
1. Verification of availability of qualified personnel needed to develop and update schedule.
 2. Phasing, work stages, school requirements, milestones, and partial Board occupancy.
 3. Delivery dates for the Board-furnished products, if any.
 4. Schedule for work of the Board's separate contracts, if any.
 5. Time required for review of submittals and resubmittals.
 6. Time required for fabrication and delivery of key and long lead items.
 7. Requirements for tests and inspections by independent testing and inspecting agencies.
 8. Time required for completion and startup procedures, including commissioning activities.
 9. Closeout procedures and documentation, including project record documents and warranties.
 10. Review and finalize list of construction activities to be included in schedule.
 11. Procedures for updating schedule.

12. School's programmatic schedule (which should be reflected by assigning a calendar).

1.5 PAYMENT

- A. Contractor's Application for Payment – Initial: Approval of the first Application for Payment submitted by the Contractor **shall be withheld** until the Contractor has an approved baseline construction schedule.
- B. Contractor's Application for Payment – Subsequent: Approval of subsequent Applications for Payments **shall be withheld** until the Contractor provides required updates of the construction schedule.

PART 2 - PRODUCTS

2.1 BASELINE CONSTRUCTION SCHEDULE

- A. Delivery: Within seven (7) days of receipt of Notice of Award (NOA), submit a preliminary baseline construction schedule to the Board Authorized Representative for review and approval or rejection.
 1. The preliminary baseline construction schedule shall be created in the Board's scheduling software, and shall be sorted by early start and total float.
- B. Preparation: The preliminary baseline construction schedule shall include all work by subcontractors, sub-subcontractors, suppliers, and other entities contracted to provide services or manpower required to complete the Work.
 1. Narrative: With the preliminary baseline construction schedule, a written narrative shall be provided to the Board Authorized Representative. The narrative shall describe the Project sequencing, calendars used, critical path, Board constraints, phasing showing existing operational conditions, resource utilizations, major equipment used, weather days accounted for, risks analysis, proposed building engineer's overtime request, and any other Board applied or required resources.
- C. Review: The preliminary baseline construction schedule shall be reviewed by the Board Authorized Representative and approved or rejected. The Board Authorized Representative shall notify the Contractor in writing of their approval or rejection of the preliminary baseline construction schedule within four (4) days of receipt of initial construction schedule from the Contractor.
 1. If rejected by the Board Authorized Representative, the Contractor shall submit a revised initial construction schedule within three (3) days of receipt of written notice of rejection.
 2. This procedure shall be followed until the preliminary baseline construction schedule is acceptable to the Board Authorized Representative.
 - a. When directed by the Board Authorized Representative, the Contractor shall add cost- and resource-loading to the baseline construction schedule

- D. Upon review and approval of the preliminary baseline construction schedule by the Board Authorized Representative, the preliminary baseline construction schedule, as approved, shall become the Project's baseline construction schedule, including cost- and resource-loading.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Schedule, General: The Board requires a cost- and resource-loaded schedule using the critical path method (CPM), resulting in a time-scaled CPM network analysis diagram for the Work. The cost-loaded schedule shall be created using the Board's latest Primavera format to provide the Board the ability to complete Earned Value Analysis (EVA) during the Project's life cycle, and shall be used to monitor construction progress and to determine earnings, including the amount of each progress payment submitted, for each update period.
 - 1. The Board's scheduling software shall be the only format accepted for the Contractor's construction schedule. File importing shall not be allowed.
 - 2. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of the Board Authorized Representative's or Architect's approval of the schedule.
 - 3. Lack of an approved schedule, or qualified scheduling personnel, shall prevent the Board Authorized Representative from properly evaluating progress of the Work and reviewing progress payments.
 - 4. Failure to provide the information specified shall result in rejection of the baseline construction schedule, bi-weekly schedule updates, and revised schedules.
 - 5. When revisions requested by the Board Authorized Representative are not addressed in subsequent updates to the schedule, the Board may withhold approval of Contractor's Application for Payment each pay period until the required revisions are incorporated into the schedule.
 - 6. The Contractor shall monitor and update the CPM schedule, and report progress to the Board Authorized Representative.
- B. Delivery: Within seven (7) days of approval of Project baseline construction schedule, submit a cost- and resource-loaded construction schedule to the Board Authorized Representative for review and approval or rejection.
 - 1. Review: Within four (4) days of receipt of the Contractor's construction schedule, the Board Authorized Representative shall review and approve or reject the Contractor's construction schedule, and notify the Contractor in writing of their approval or rejection.
 - a. If rejected by the Board Authorized Representative, the Contractor shall submit a revised construction schedule within three (3) days of receipt of written notice of rejection.
 - b. This procedure shall be followed until the Contractor's construction schedule is approved by the Board Authorized Representative.
- C. Narrative: With the Contractor's construction schedule, including each update to the schedule, a written narrative shall be provided to the Board Authorized Representative. The narrative shall describe the Project sequencing, calendars used, critical path, Board constraints, phasing showing existing operational conditions, resource

utilizations, major equipment used, weather days accounted for, risks analysis, proposed building engineer's overtime request, and any other Board applied or required resources.

- D. Time Frame: Extend schedule from the date established for the Notice of Award (NOA) to the date identified for Final Acceptance (FA).
 - 1. Use "one workday" as the unit of time for individual activities. Include nonworking days and holidays incorporated into the schedule in order to coordinate with the established Contract Time.
- E. Activities: Include work to be performed by the Contractor and its subcontractors or suppliers, the Board, other contractors, and/or other entities as required for successful completion of the Project. Indicate the estimated time duration, sequence requirements, and relationship for each activity in relation to other activities.
 - 1. Duration: Define activities so no activity is longer than 14 days, unless the Board Authorized Representative has agreed to a greater time period in writing. Exceptions include long lead items and deliveries.
 - 2. Relationships: All activities are to be linked to each other with predecessors/successors relationships so that the only activity without predecessors is the first activity (Notice of Award) on the schedule, and the only activity without successors is the last activity on the schedule (Final Completion).
 - a. Include as many predecessor/successor relationships as required to produce a chain of logic that automatically and accurately adjusts as status of the Work changes.
 - b. The following relationship types shall not be used:
 - 1) Lags.
 - 2) Open ended relationships.
 - 3) Constraints.
 - 3. Attributes: For each activity in the schedule, include the following:
 - a. Unique activity description, using attributes such as type of work and location as required to distinguish activities.
 - b. Contractors shall create each activity to reside within the WBS template defined by CPS.
 - c. Resource values for cost, major equipment, and manpower. The sum of costs assigned to activities shall equal the total Contract Sum.
 - d. Logically assign each activity to a calendar.
 - 1) The number of school days may change during the Project's duration. Any changes in the number of school days shall be reflected in the schedule update immediately following receipt of a written notification of the change from the Board Authorized Representative.
 - e. Weather dependent activity durations are calculated using the NOAA 10 year average. In order to properly compute any anticipated weather delays, add the appropriate number of working days to each weather dependent activity based on the NOAA 10 year average.
 - 4. Milestones: Milestones are activities of zero day's duration that represent a key point in the Project. Include in the Project schedule as indicated in the Contract Documents and as otherwise required.
 - a. Include the following, at a minimum:
 - 1) Notice of Award (NOA).
 - 2) Notice to Proceed (NTP).

- 3) Last day of school.
 - 4) Day school faculty (teachers) return.
 - 5) Start of school.
 - 6) Preliminary Acceptance (PA).
 - 7) Final Acceptance (FA).
 - b. Include the following as applicable to the Project and as directed by the Board Authorized Representative:
 - 1) Start/end of Project phases.
 5. School Activities, Breaks, and Holidays: Include observed holidays, school holidays, and school activities that affect construction-related activities. These activities include:
 - a. Observed national holidays.
 - b. Local/School holidays.
 - c. Spring break.
 - d. Winter break.
 - e. Testing dates.
 - f. Start of School: No work can be performed onsite for 2 days after the start of school.
 6. Procurement Activities: Include procurement process activities for long-lead items and major items as separate activities in the schedule. Procurement activities shall include submittals, approvals, purchasing, fabrication, delivery, installation, and start-up activities (if required).
 7. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in the schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 8. Board-Furnished Products: Include a separate activity for each product, with delivery date indicating the earliest possible delivery date.
 9. Preliminary Acceptance: Indicate completion in advance of date established for Preliminary Acceptance, and allow time for inspections, receipt of Certificate of Occupancy, and other administrative procedures necessary for Architect's and Board Authorized Representative's review and certification of Preliminary Acceptance.
 10. Punch List and Final Acceptance: Include not more than **60 days** following Preliminary Acceptance for completion of minor (punch list) work and Final Acceptance.
 11. Miscellaneous Activities: Include and indicate the following as separate activities (as applicable):
 - a. Mobilization and demobilization.
 - b. Receipt of required permits, temporary closure of public way (if required), and inspections by authorities having jurisdiction.
 - c. Installation and removal of temporary facilities and utilities.
 - d. Utility notification(s), interruption(s), and relocation(s).
 - e. HVAC system start-up and commissioning.
 - f. Project record document preparation and submission.
 - g. Demonstration and training, as required.
- F. Recovery Schedule: When a periodic update indicates the Work is seven (7) or more days behind the approved schedule, submit, no later than the next schedule update, a separate recovery schedule indicating a workable plan to come into compliance with

the approved schedule and complete the Project, including achieving interim milestone dates, by the previously approved date. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance with the approved schedule and narrative, and date by which recovery shall be accomplished. The Board may withhold a portion of progress payments until an acceptable recovery schedule is submitted.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor has the duty to deliver to the Board an approved construction schedule. The Contractor shall not assert any claim whatsoever for any delay or additional cost incurred in connection with the development, maintenance, and updating of the schedule. No payment shall be awarded to the Contractor until a baseline schedule has been submitted and approved.

3.2 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the Schedule of Values, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.

3.3 ELECTRONIC SCHEDULING

- A. Scheduling Software: Contractor shall use the Board's scheduling software for creating the baseline schedule, preparing all bi-weekly schedule updates (summer construction), monthly schedule updates (construction during the school year), revised schedules, and preparing recovery schedules as required.

3.4 REVIEWS

- A. General: Review and acceptance of the Contractor's construction schedule, including any revisions and/or updates, by the Board Authorized Representative and Architect/Engineer is advisory only and does not relieve the Contractor of the responsibility for accomplishing each portion of the Work within the time provided by the Contract Documents. Omissions and errors in the accepted schedule, including any revisions and/or updates, shall not excuse performance that is not in compliance with the Contract Documents.
- B. Baseline Construction Schedule: Immediately following submission of the preliminary baseline construction schedule, the Board Authorized Representative shall coordinate a meeting with the Contractor and Architect/Engineer to review the submitted schedule.
 - 1. All issues regarding the schedule shall be reviewed and resolved at this meeting.

2. If issues remain unresolved at the end of the meeting, the Board Authorized Representative shall establish the date and time for a second meeting
- C. The Board Authorized Representative shall review each submitted schedule and return the reviewed schedule, including any comments and required revisions, to the Contractor within the following time frames:
 1. Baseline Schedule: Seven (7) days of receipt by the Board Authorized Representative.
 2. Updated Schedule: Four (4) days of receipt by the Board Authorized Representative.
 3. Revised Schedule: Four (4) days of receipt by the Board Authorized Representative.
- D. A schedule found to be impractical for any reason shall be revised and resubmitted by the Contractor within three (3) days.

3.5 UPDATES

- A. The Contractor's construction schedule shall be updated on a bi-weekly basis (summer construction - from end of school to the start of school) or monthly basis (during the school year) to indicate the status of the Project and progress of the Work, as well as the plan for completion of the Project. The updated schedule shall include a new data date. Indicate the projected days remaining for each activity in the schedule as the Work progresses.
 1. The updated schedule and update narrative shall be submitted within two (2) days following the data date.
 2. Coordinate a meeting two days following the data date to review, and to resolve any issues with, the updated schedule. Attendees shall include the Contractor, Board Authorized Representative, and Architect/Engineer.
- B. Update Narrative: With each schedule update, submit a written narrative listing all activities that have been revised since the last schedule update. Also include a list of itemized explanations of all changes to the construction schedule, including all activities that have been added to or deleted from the schedule, and logic changes. This narrative shall be created with a word processing program and shall be submitted as portable document format (PDF).

3.6 REVISIONS

- A. Board Requested Revisions: The Board retains the right to request a revised schedule for reasons that include, but are not limited to, the following:
 1. A projected or forecasted delay to critical activities.
 2. Delay of a non-critical activity that changes the course of the critical path.
 3. A Change Order or RFI that affects the completion date or sequence of activities.
- B. Contractor Requested Revisions: The Contractor shall notify the Board Authorized Representative in writing of any requested changes to the schedule, including changes

to the logic or duration of activities. The written request shall clearly outline the reason(s), in detail, for each change requested.

1. All Contractor requested revisions to the schedule including, but not limited to, any change to the schedule logic, order or sequence of activities, or duration of activities, shall be approved by the Board Authorized Representative in writing before the revisions are implemented and the schedule revised.

3.7 CONTRACT MODIFICATIONS

- A. Extensions of the Contract Time shall not be allowed unless approved in writing by the Board Authorized Representative.
- B. Scheduling of approved changes in the Work is the responsibility of the Contractor.
- C. With each proposed contract modification, prior to initiation of related work, submit a separate schedule analysis to the Board Authorized Representative for review. Each schedule analysis shall include all activities required to complete the proposed change and indicate the effect of the proposed change on the overall project schedule.
 1. The schedule analysis shall indicate all affected and revised activities, the duration of the change, the cost(s) of the change, any constraints that result from the change, and whether the change is concurrent or sequential.
 2. This analysis shall be attached to any Contractor proposal if time extensions are requested.
- D. If the Board Authorized Representative accepts the proposed revision, including the schedule analysis, the revised schedule, including all activities required to incorporate the change and complete the Project, shall become the basis for the next bi-weekly update to the schedule.

3.8 DELAYS AND EXTENSIONS OF TIME

- A. The Contractor shall execute its work as required to maintain progress of the Work in accordance with the accepted construction schedule. Should the Contractor fail to maintain progress according to the approved schedule, the Contractor shall take measures necessary to bring progress of the Work into line with the schedule at no additional cost to the Board.
- B. The Contractor shall be responsible for requesting an extension of the Contract Time due to a delay or occurrence that negatively impacts, in the opinion of the Contractor, the critical path of the Project. All requests shall be submitted to the Board Authorized Representative in writing within seven (7) days of the delay.
 1. Failure to submit a written request to the Board Authorized Representative within the specified time period shall result in rejection of the request for extension of the Contract Time and any related request(s) for a change to the Contract Sum.
 2. Delays to non-critical activities (those with float) shall not be considered a basis for either a change in the Contract Time or a change in the Contract Sum.

3. Extensions of the Contract Time shall not be considered accepted and shall not be incorporated into the schedule unless accepted in writing by the Board Authorized Representative.
 - a) When the Board Authorized Representative finds the Contractor is entitled to an extension in Contract Time, the total number of days extension shall be based upon the current analysis of the schedule and upon the data relevant to the extension.
 - b) When agreement to an acceptable extension in time cannot be reached, the Contractor shall incorporate schedule changes in accordance with the Board Authorized Representative's direction.
- C. With each request for an extension of the Contract Time, a separate schedule analysis and written narrative shall be submitted to the Board Authorized Representative.
 1. The schedule analysis shall be in the form of a bi-weekly schedule update, with adjusted activity durations and appropriate resource-loading, and logic relationships for the added scope. The schedule analysis shall clearly indicate how all of the schedule's activities are affected, including float related to the affected activities, and how the Project's completion date is impacted, by the requested time extension.
 2. The written narrative shall list all activities that are to be added to or deleted from the schedule, as well as all activities that are to be changed in any way. The narrative shall include a list of itemized explanations of all changes to the schedule.

3.9 DISTRIBUTION

- A. Distribution: Distribute copies of approved schedule to Architect, Board Authorized Representative, subcontractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility and as otherwise directed by the Board Authorized Representative.
 1. Post large scale copy of the baseline schedule 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.

3.10 REPORTS

- A. General: Reports shall be created and prepared, and electronically submitted within the Board's contract management software (Primavera CM).
- B. Daily Construction Reports: Prepare daily construction reports recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel and equipment at Project site.
 4. All visitors the job site. Include each person's name and name of company.

5. Material delivery information.
 6. High and low temperatures and general weather conditions.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Bulletins received.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. All work performed that day on a time and materials basis. Include hours expended for labor and equipment and any material(s).
 19. Any proposed change order work not yet approved, completed that day.
- C. Special Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise the Board Authorized Representative in advance when these events are known or predictable.

END OF SECTION 01 32 16

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect/Engineer's and Owner's Representative's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect/Engineer's and Owner's Representative's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect/Engineer and Owner's Representative and additional time for handling and reviewing submittals required by those corrections.

Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

PART 2 - Submit revised submittal schedule to reflect changes in current status and timing for submittals.

Format: Arrange the following information in a tabular format:

PART 3 - Scheduled date for first submittal.

PART 4 - Specification Section number and title.

PART 5 - Submittal category: Action; informational.

PART 6 - Name of subcontractor.

PART 7 - Description of the Work covered.

PART 8 - Scheduled date for Architect/Engineer's and Owner's Representative's final release or approval.

PART 9 - Scheduled date of fabrication.

PART 10 - Scheduled dates for purchasing.

PART 11 - Scheduled dates for installation.

PART 12 - Activity or event number.

12.1 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect/Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect/Engineer for Contractor's use in preparing submittals, except as noted under Article 1.6.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

PART 13 - Architect/Engineer and Owner's Representative reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- A. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect/Engineer's and Owner's Representative's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer and Owner's Representative will advise Contractor when a submittal being processed must be delayed for coordination.

Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

Resubmittal Review: Allow 14 days for review of each resubmittal.

Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect/Engineer and to Architect/Engineer's consultants, allow 7 days for review of each submittal. Submittal will be returned to Architect/Engineer and Owner's Representative, through Architect/Engineer, before being returned to Contractor.

- B. Identification and Information: Place a permanent label or title block on each submittal item for identification.

Indicate name of firm or entity that prepared each submittal on label or title block.

Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect/Engineer and Owner's Representative.

Include the following information for processing and recording action taken:

PART 14 - Project name.

PART 15 - Date.

PART 16 - Name of Architect/Engineer.

PART 17 - Name of Owner's Representative.

PART 18 - Name of Contractor.

PART 19 - Name of subcontractor.

PART 20 - Name of supplier.

PART 21 - Name of manufacturer.

PART 22 - Submittal number or other unique identifier, including revision identifier.

- 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

PART 23 - Number and title of appropriate Specification Section.

PART 24 - Drawing number and detail references, as appropriate.

PART 25 - Location(s) where product is to be installed, as appropriate.

PART 26 - Other necessary identification.

Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect/Engineer or Owner's Representative observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

PART 27 - Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect/Engineer and Owner's Representative.

Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer and Owner's Representative will return without review submittals received from sources other than Contractor.

PART 28 - Transmittal Form for Paper Submittals: Use AIA Document G810.

PART 29 - Transmittal Form for Paper Submittals: Provide locations on form for the following information:

- 1) Project name.
- 2) Date.
- 3) Destination (To:).
- 4) Source (From:).
- 5) Name and address of Architect/Engineer.
- 6) Name of Owner's Representative.
- 7) Name of Contractor.
- 8) Names of subcontractor, manufacturer, and supplier.
- 9) Category and type of submittal.
- 10) Submittal purpose and description.
- 11) Specification Section number and title.
- 12) Drawing number and detail references, as appropriate.
- 13) Indication of full or partial submittal.
- 14) Transmittal number, numbered consecutively.
- 15) Submittal and transmittal distribution record.
- 16) Remarks.
- 17) Signature of transmitter.

- B. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

Name file with submittal number or other unique identifier, including revision identifier.

PART 30 - File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineer and Owner's Representative.

Include the following information on an inserted cover sheet:

PART 31 - Project name.

PART 32 - Date.

PART 33 - Name and address of Architect/Engineer.

PART 34 - Name of Owner's Representative.

PART 35 - Name of Contractor.

PART 36 - Name of firm or entity that prepared submittal.

PART 37 - Names of subcontractor, manufacturer, and supplier.

PART 38 - Category and type of submittal.

PART 39 - Specification Section number and title.

PART 40 - Drawing number and detail references, as appropriate.

PART 41 - Location(s) where product is to be installed, as appropriate.

PART 42 - Related physical samples submitted directly.

PART 43 - Other necessary identification.

Include the following information as keywords in the electronic submittal file metadata:

PART 44 - Project name.

PART 45 - Number and title of appropriate Specification Section.

PART 46 - Manufacturer name.

PART 47 - Product name.

- A. Options: Identify options requiring selection by Architect/Engineer.

- B. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer and Owner's Representative on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- C. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
Note date and content of previous submittal.
Note date and content of revision in label or title block and clearly indicate extent of revision.
Resubmit submittals until they are marked with approval notation from Architect/Engineer's and Owner's Representative's action stamp.
- D. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- E. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineer's and Owner's Representative's action stamp.

PART 48 - PRODUCTS

48.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

Post electronic submittals as PDF electronic files through the Owner's representative on the web address established for the Project.

- a) Architect/Engineer, through Owner's Representative, will return annotated file.

Submit electronic submittals via email as PDF electronic files.

PART 49 - Architect/Engineer, through Owner's Representative, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect/Engineer, through Owner's Representative, will return two copies.

Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect/Engineer and Owner's Representative will not return copies.

Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

PART 50 - Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

PART 51 - Provide a notarized statement on original paper copy certificates and certifications where indicated.

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

Mark each copy of each submittal to show which products and options are applicable.

Include the following information, as applicable:

PART 52 - Manufacturer's catalog cuts.

PART 53 - Manufacturer's product specifications.

PART 54 - Standard color charts.

PART 55 - Statement of compliance with specified referenced standards.

PART 56 - Testing by recognized testing agency.

PART 57 - Application of testing agency labels and seals.

PART 58 - Notation of coordination requirements.

PART 59 - Availability and delivery time information.

For equipment, include the following in addition to the above, as applicable:

PART 60 - Wiring diagrams showing factory-installed wiring.

PART 61 - Printed performance curves.

PART 62 - Operational range diagrams.

PART 63 - Clearances required to other construction, if not indicated on accompanying Shop Drawings.

Submit Product Data before or concurrent with Samples.

Submit Product Data in the following format:

PART 64 - Three copies.

A. Shop Drawings: Prepare Project-specific information, drawn accurately to scale.

Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

PART 65 - Identification of products.

PART 66 - Schedules.

PART 67 - Compliance with specified standards.

PART 68 - Notation of coordination requirements.

PART 69 - Notation of dimensions established by field measurement.

PART 70 - Relationship and attachment to adjoining construction clearly indicated.

PART 71 - Seal and signature of professional engineer if specified.

Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

Submit Shop Drawings in the following format:

PART 72 - PDF electronic file.

- A. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

Identification: Attach label on unexposed side of Samples that includes the following:

PART 73 - Generic description of Sample.

PART 74 - Product name and name of manufacturer.

PART 75 - Sample source.

PART 76 - Number and title of applicable Specification Section.

Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

PART 77 - Number of Samples: Submit 3 full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect/Engineer, through Owner's Representative, will return submittal with options selected.

Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

PART 78 - Number of Samples: Submit three sets of Samples. Architect/Engineer and Owner's Representative will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

- 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- B. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.

Manufacturer and product name, and model number if applicable.

Number and name of room or space.

Location within room or space.

- C. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- D. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- E. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
- F. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- G. LEED Submittals: Comply with requirements specified in Division 01 sustainable design requirements Section.
- H. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architect/Engineers and owners, and other information specified.
- I. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- J. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- K. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- N. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- O. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- P. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

Name of evaluation organization.

Date of evaluation.

Time period when report is in effect.

Product and manufacturers' names.

Description of product.

Test procedures and results.

Limitations of use.

- Q. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- R. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- S. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- T. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

78.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit signed PDF electronic file of certificates, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 79 - EXECUTION

79.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer and Owner's Representative.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

79.2 ARCHITECT/ENGINEER'S AND CONSTRUCTION MANAGER'S ACTION

- A. Action Submittals: Architect/Engineer and Owner's Representative will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer and Owner's Representative will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect/Engineer and Owner's Representative will review each submittal and will not return it, or will return it if it does not comply with requirements.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect/Engineer and Owner's Representative.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect/Engineer without action.

END OF SECTION 01 33 00

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closeout procedures.
2. Final cleaning.
3. Starting of systems.
4. Demonstration and instructions.
5. Testing, adjusting and balancing.
6. Protecting installed construction.
7. Project record documents.
8. Operation and maintenance data.
9. Spare parts and maintenance Products.
10. Product warranties and product bonds.
11. Maintenance service.

1.2 CLOSEOUT PROCEDURES

- A. Submit closeout documentation listed in individual specification sections of Project Manual and Scheduled at end of section.
- B. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/ Engineer's review.
- C. Provide submittals to Owner required by authorities having jurisdiction.
- D. Submit remaining due final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer and Owner seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, ve rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturer's instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment and instruct in classroom environment located at Project and instructed by qualified manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

- A. Contractor shall appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing.
- B. Independent firm will perform services specified in Division 23.
- C. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

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

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 7. Manufacturer's name and product model and number.
 8. Product substitutions or alternates utilized.
 9. Changes made by Addenda and modifications.
- F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured depths of foundations in relation to finish floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.
- G. Submit documents to Architect/Engineer for initial review 10 days prior to Substantial Completion inspection.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 20 pound white paper, in three parts as follows.

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.
- F. Submit manuals to Architect/Engineer for initial review 10 days prior to Substantial Completion inspection.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

- G. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- H. Deliver to Project site and place in location as directed by Owner; obtain receipt 10 days prior to Substantial Completion inspection.

1.11 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.

- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit to Architect/Engineer for initial review 10 days prior to Substantial Completion inspection.
- G. Time of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.12 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections for time periods indicated.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION

3.1 SCHEDULE

- A. Closeout documents, operation and maintenance data, warranties and bonds, extra materials, and maintenance agreements shall be submitted for, but not limited to, the items listed in each Section of Specifications. Submittals, in addition to those listed, include those identified in PART 1 of this Section.

END OF SECTION 01 70 00

SECTION 01 73 00 EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Installation of the Work.
 - 3. Cutting and patching.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.
- B. Related Sections:
 - 1. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 2. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning any work, investigate and verify the existence and location of existing mechanical and electrical systems, and other construction affecting the Work.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by

field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect/Engineer according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect/Engineer promptly.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect/Engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

- A. Owner will install furniture during construction of this contract.
- B. Site Access: Provide access to Project site for Owner's construction personnel.
- C. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

3. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 5.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 6. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
1. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 2. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
- B. 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous construction waste.
 - 2. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Division 01 Section "Multiple Contract Summary" for coordination of responsibilities for waste management.
 - 2. Division 02 Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.
 - 3. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.
 - 4. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.
 - 5. Division 04 Section "Stone Masonry" for disposal requirements for excess stone and stone waste.
 - 6. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- B. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.
2. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For waste management coordinator.
- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review

methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).

4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.

- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
Comply with requirements in Division 32 Section "Plants." for use of clean ground gypsum board as inorganic soil amendment.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 01 Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.
 - 3. Division 01 Section "Execution" for progress cleaning of Project site.
 - 4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 5. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 6. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 7. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs [**and photographic negatives**], damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect [**and Construction Manager**] will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. **[Submit demonstration and training videotapes.]**
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect **[and Construction Manager]** will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit **[three]** **<Insert number>** copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. **[Use CSI Form 14.1A.]**
1. Organize list of spaces in sequential order, **[starting with exterior areas first]** **[and]** **[proceeding from lowest floor to highest floor]**.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect **[and Construction Manager]**.
 - d. Name of Contractor.
 - e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within **[15] <Insert number>** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment [**elevator equipment**,] and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.

- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 01 Section "Multiple Contract Summary" for coordinating Project Record Documents covering the Work of multiple contracts.
 - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit **[one]** <Insert number> set(s) of marked-up Record Prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit **[one]** <Insert number> set(s) of **[corrected Record Transparencies]** **[plots from corrected Record CAD Drawings]** and **[one]** <Insert number> set(s) of marked-up Record Prints. Architect will initial and date each **[transparency]** **[plot]** and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return **[transparencies]** **[plots]** and prints for organizing into sets, printing, binding, and final submittal.

- b. Final Submittal: Submit **[one]** **<Insert number>** set(s) of marked-up Record Prints, **[one]** **<Insert number>** set(s) of Record Transparencies, and **[three]** **<Insert number>** copies printed from Record Transparencies. Print each Drawing, whether or not changes and additional information were recorded.
- c. Final Submittal: Submit **[one]** **<Insert number>** set(s) of marked-up Record Prints, **[one]** **<Insert number>** set(s) of Record CAD Drawing files, **[one]** **<Insert number>** set(s) of Record CAD Drawing plots, and **[three]** **<Insert number>** copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
 - 1) Electronic Media: **[3-1/2-inch diskettes, formatted for 1.44 MB] [CD-R]**.
- B. Record Specifications: Submit **[one copy]** **[<Insert number> copies]** of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit **[one copy]** **[<Insert number> copies]** of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.

- c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or [**Construction**] [**Work**] Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect [**and Construction Manager**]. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Architect [**through Construction Manager**] for resolution.
 3. Owner will furnish Contractor one set of transparencies of the Contract Drawings for use in recording information.
 4. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Architect will make the Contract Drawings available to Contractor's print shop.
- C. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect [**and Construction Manager**]. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
 2. Format: [**DWG**] [**DXF**] [**DGN**], Version <Insert designation>, operating in [**Microsoft Windows**] [**Apple Macintosh**] operating system.

3. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 4. Refer instances of uncertainty to Architect [**through Construction Manager**] for resolution.
 5. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
 - a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
 - b. CAD Software Program: The Contract Drawings are available in **<Insert name and version of CAD program and operating system>**.
- D. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect [**and Construction Manager**] for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- E. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
 3. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect [**and Construction Manager**].
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. Note related Change Orders [, **Record Product Data,**] and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders [, **Record Specifications,**] and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's [**and Construction Manager's**] reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Duties of Contractor.
- B. Commissioning Authority.
- C. Commissioning Plan.
- D. Acceptance procedures.
- E. Training and instruction.

1.2 RELATED SECTIONS

- A. Make particular reference to the following sections:
 - 1. Section 01 33 00 – Submittal Procedures.
 - 2. Section 01 77 00 – Closeout Procedures.
 - 3. Section 01 78 23 – Operation and Maintenance Data.
 - 4. Section 01 78 39 – Project Record Documents
 - 5. Section 22 33 00 – Electric, Domestic Water Heaters
 - 6. Section 22 34 00 – Fuel Fired, Domestic Water Heaters
 - 7. Section 23 05 93 –Testing, Adjusting and Balancing for HVAC
 - 8. Section 23 08 00 – Commissioning of HVAC
 - 9. Section 23 09 01 – Energy Management Control System
 - 10. Section 23 21 23 – Pumps
 - 11. Section 23 34 23 – Power Ventilators
 - 12. Section 23 36 00 – Air Terminal Units
 - 13. Section 23 65 00 – Cooling Towers
 - 14. Section 23 73 13 –Indoor Central – Station Air-Handling Units

15. Section 26 08 00 – Commissioning of Electrical Systems
16. Section 26 09 13.10 – Electric Power Monitoring and Control
17. Section 26 09 13.11– Electrical Supervisory Control and Data Acquisition (SCADA) System Network Architecture
18. Section 26 09 13.54 – Sequence of Events Recording (SER)
19. Section 26 09 43 – Network Lighting Controls
20. Section 26 11 16 – Secondary Unit Substations
21. Section 26 13 00 – Medium-Voltage Switchgear
22. Section 26 22 00 – Low-Voltage Transformers
23. Section 26 23 00 – Low-Voltage Switchgear
24. Section 26 24 16 – Panelboards
25. Section 26 25 00 – Enclosed Bus Assemblies
26. Section 26 28 16 – Enclosed Switches and Circuit Breakers
27. Section 26 29 13 – Enclosed Controllers
28. Section 26 29 23 – Variable-Frequency Motor Controllers
29. Section 26 32 13 – Engine Generators
30. Section 26 33 53 – Static Uninterruptible Power Supply
31. Section 26 36 00 – Transfer Switches

1.3 TERMS

- A. Commissioning Plan: The preliminary Commissioning Plan has been prepared by the Owner's Commissioning Authority (CA), and shall be implemented by the Contractor and CA together. The commissioning plan outlines the organization, scheduling, documentation, etc., pertaining to the overall commissioning process. A Commissioning Plan shall be updated as the commissioning process is developed.
- B. Functional Performance Testing: That full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the contract documents. In this context, "function" includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.

- C. Acceptable Performance: A component or system being able to meet specified design parameters under actual load including satisfactory documented completion of all functional performance tests, control system trending, and resolution of outstanding issues.
- D. Commissioning: The process to assure the Owner that mechanical and electrical equipment, controls, and systems function together properly to meet performance requirements and design intent as shown in a composite manner in the Contract Documents.

1.4 DUTIES OF CONTRACTOR

- A. Collect and assemble the Subcontractor and/or supplier information required for development of a complete Commissioning Plan and Functional Performance Test for all systems to be commissioned and provide to the Commissioning Authority. The Contractor and appropriate Subcontractors shall review these documents. Confirm in writing to the Owner, Architect, and Commissioning Authority any known areas of conflict or areas requiring clarification.
- B. Review all functional performance tests and documentation required by the contract documents for all equipment and systems.
- C. Collect all proposed start-up and pre functional performance documentation from appropriate Subcontractors, third party testing agencies, and equipment vendors. Provide that information for review and approval by the Commissioning Authority. Incorporate that information into the Field Commissioning Notebook. The Field Commissioning Notebook for this project will be implemented through the VELA quality assurance data base system.
- D. The Field Commissioning Notebook (VELA System) will be stored and managed by the Contractor. The Contractor shall confirm through the VELA System to the Commissioning Authority that systems are complete, functional, and the appropriate Subcontractors have signed off all pre functional checklist documentation.
- E. Participate in regular commissioning meetings with the Architect and Commissioning Authority. Coordinate directly with each Subcontractor on their specific responsibilities and contractual obligation.
- F. Coordinate the required Architect, Commissioning Authority, and Owner testing participation and approval procedures, after verifying that start-up and pretests have been satisfactorily conducted and final tests are ready to be performed.

- G. Review operation and maintenance data provided by the various Subcontractors and suppliers for verification, organization, distribution, and conformance to requirement of Contract Documents.

1.5 COMMISSIONING AUTHORITY

- A. The Commissioning Authority is contracted to direct the commissioning process through appropriate contract channels, perform functional performance test, and recommend project completion from the commissioning perspective.
- B. The duties of the Commissioning Authority are as follows.
 - 1. Develop the Commissioning Plan.
 - 2. Develop Functional Test Procedures from final control documentation including narrative sequences of operation, control diagrams, and software code for execution with the assistance of Contractor staff as required.
 - 3. Develop the appropriate documentation as necessary to ensure that all aspects of start-up and testing have been completed and documented prior to functional performance testing.
 - 4. Witness and verify satisfactory completion of equipment and component tests and systems and inter- systems performance tests.
 - 5. Provide site observation, functional performance test, and other project reports in a timely manner. Document inconsistencies or deficiencies in system operations and system compliance. System deficiencies shall be forwarded to the Architect and tracked with normal punchlisting activities.
 - 6. Participate in the development of schedules with the Contractor for start-up and functional performance testing. This is to be coordinated with required building purge or Owner occupancy schedules required by the Owner.
 - 7. Review Testing Adjusting and Balancing (TAB) reports and witness and direct TAB in verification effort.
 - 8. Coordinate, via the Architect, participation of Owner's personnel involved with equipment, component, and systems performance verification and participation in required training.
 - 9. Direct and perform functional performance tests with assistance from Subcontractors as required.
 - 10. When commissioning has been successfully completed, recommend acceptance to the Owner.

11. Verify that appropriate operation and maintenance manuals and project redline drawings have been provided by various Subcontractors.
 12. Once all functional performance tests have been successfully completed and all outstanding issues resolved, the Commissioning Authority will provide the Owner with a final report of all commissioning activities that occurred during the project.
- C. The Commissioning Authority will formally communicate with the Contractor via approved project channels. It is expected, however, that informal communication and coordination will be conducted directly with the Subcontractors. Records of all contacts will be sent to the Architect through the normal channels.
- D. The Commissioning Authority is not authorized to modify, add to, or revoke the requirements of the Contract Document. A change in the Work can only be made as provided in the General Conditions.

1.6 PRELIMINARY COMMISSIONING PLAN

- A. This Preliminary Commissioning Plan details the implementation of the commissioning process. It includes the requirements that each party involved in the commissioning process will have to accomplish, including sequence, scheduling, documentation requirements, verification procedures, etc. The Final Commissioning Plan, which will include more project specific information, will be provided by the Commissioning Authority during project execution.
1. The Final Commissioning Plan shall include the following.
 - a. The Commissioning Schedule: This schedule defines the milestones and conditions that must be achieved before system testing and other commissioning activities can commence. The schedule also includes the expected duration of the various tasks, so that the commissioning process can be incorporated into the overall construction schedule.
 - b. Preparation for Testing: To prepare for the system functional performance testing, the Commissioning Authority will examine the design and construction documents, develop Pre-functional Checklists of construction responsibilities that must be completed prior to testing, and develop detailed Functional Performance Test Procedures and data forms. Using the Pre-functional Checklists, each Subcontractor must verify that the systems they install are in compliance with the construction documents and are fully functional. Commissioning is not intended to be a testing or inspection function that replaces any of the Contractors' obligations for testing and proof of performance. Functional performance testing will only begin when checklists are completed by the appropriate Subcontractors, initialed, signed,

and installed into the Field Commissioning Notebook (VELA System) accompanied with a written letter from the Contractor indicating specific system completion.

- c. Functional Performance Testing: Functional performance testing is performed by the Commissioning Authority to verify proper sequencing, operation, and performance of installed equipment and systems under realistic operating conditions. As tests are successfully completed, a functional performance test checklist will be used to document the testing progress.
- d. Documentation: In addition to the Pre-functional Checklists and Functional Performance Test Procedures, written documentation will be maintained for all other commissioning activities. Project communication reports shall be issued by the Commissioning Authority to the Architect and key members of the commissioning team to document apparent deficiencies identified during examination of design and construction documents, daily activities on-site, construction deficiencies, and successful or unsuccessful functional performance testing results. These project communication reports will also be kept in the Field Commissioning Notebook (VELA System). At the end of the commissioning process, all documentation will be assembled and summarized in the final commissioning report.
- e. Problem Resolution: When a project communication report is issued to address an identified deficiency, the Architect shall forward the reports to the appropriate parties to initiate corrective action in an expeditious manner. Deficiencies will be tracked as part of the punchlisting activity.

B. Commissioning Roles and Responsibilities:

- 1. The responsibilities for commissioning are divided between the Architect, the General Contractor and its Subcontractors, and the Commissioning Authority as follows.
 - a. Design Team:
 - 1) Review the commissioning documentation and provide comments as necessary.
 - 2) Participate in determination of final controls system I/O Points List and Sequences of Operation as required to complete functional performance test procedures with Commissioning Authority, Controls Subcontractor, and Fire Alarm Subcontractor. Review the commissioning documentation and provide comments as necessary.
 - b. General Contractor:

- 1) Incorporate commissioning activities into the general construction schedule. The schedule shall identify, among other milestones, the completion of all Functional Performance Testing, as well as the initiation and completion of the Performance Period. This shall be coordinated with required building purge and occupancy schedules required by Owner.
 - 2) Represent the Subcontractors in all related Commissioning and Construction meetings and field activities.
 - 3) Coordinate participation of Subcontractor and Commissioning Authority in the commissioning process through the Architect.
 - 4) Forward copies of submittals, operation and maintenance manuals, and as-built drawings to the Architect.
 - 5) Review the Commissioning Plan, Functional Performance Test Procedures, project communication reports, and Pre-Functional installation reports, and submit comments to the Commissioning Authority through the Architect.
 - 6) Address issues identified during construction that may affect the commissioning process or final system performance expediently.
 - 7) Forward completed Pre-functional checklists and Start-up documentation to the Commissioning Authority through the Architect in a timely manner. Provide the Commissioning Authority written notification of specific systems that are complete and ready for functional performance testing.
- c. Mechanical Subcontractor:
- 1) Coordinate participation of the mechanical Sub-subcontractors in the commissioning process in accordance with the commissioning plan and specification section 23 08 Commissioning of HVAC.
 - 2) Coordinate installation of mechanical systems and equipment with equipment suppliers, mechanical Sub-subcontractors, and electrical Subcontractor. Verify that coordination, installation, quality control, and final Sub-subcontractor testing have been completed such that installed systems and equipment comply with construction documents.
 - 3) Notify the Owner's Representative, General Contractor, and Commissioning Authority as soon as possible of any issues identified during construction that may affect the commissioning process or final system performance.

- 4) Provide Commissioning Authority with proposed start-up and testing documentation to be used for the test documentation specified in Division 15.
 - 5) Perform start-up and testing of mechanical equipment and systems and document as required with start-up reports and completion of Pre-functional Checklists. Reports shall be stored in the General Contractors field office.
 - 6) Lead verification testing of Fire/Smoke dampers and direct appropriate Sub-subcontractors in the resolution of deficiencies. Each damper and all functions of shall be tracked in a matrix spread sheet.
 - 7) Operate equipment and systems as required for functional performance testing.
 - 8) Participate in the fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.
 - 9) Provide complete operation and maintenance information and as-built drawings to the General Contractor for verification, organization, and distribution.
 - 10) Provide training for the systems specified.
- d. Electrical Subcontractor:
- 1) Coordinate participation of the electrical sub-subcontractors in the commissioning process in accordance with the commissioning plan and specification section 26 08 Commissioning of Electrical Systems.
 - 2) Coordinate installation of electrical systems and equipment with equipment suppliers, electrical Sub-subcontractors, and mechanical Subcontractor. Verify that coordination, installation, quality control, and final Sub-subcontractor testing have been completed such that installed systems and equipment comply with construction documents.
 - 3) Provide Commissioning Authority and Electrical Sub-subcontractors with Fire Alarm and lighting control system wiring diagrams and narrative sequences of operation in time for use in preparing the Functional Performance Test Procedures.
 - 4) Notify the Architect, General Contractor, and Commissioning Authority immediately of any issues identified during construction that may affect the commissioning process or final system performance.

- 5) Provide Commissioning Authority with proposed start-up and testing documentation to be used for the test documentation specified in Division 26.
- 6) Perform start-up and testing of electrical equipment and systems and document with start-up reports and completion of Pre-functional Performance Test. Reports shall be stored in the General Contractors field office.
- 7) Fire alarm Sub-subcontractor shall demonstrate full function of system to Commissioning Authority prior to Fire Marshall testing.
- 8) Telephone/Intercom/Clock Sub-subcontractor shall provide point to point documentation to Commissioning Authority prior to check out. Once system is fully operational, Sub-subcontractor shall demonstrate system to Commissioning Authority and provide documentation for witness approval of system operation.
- 9) Door Access Sub-subcontractor shall provide point to point documentation to Commissioning Authority prior to check out. Once system is fully operational, Sub-subcontractor shall demonstrate system to Commissioning Authority and provide documentation for witness approval of system operation.
- 10) Security Sub-subcontractor shall provide point to point documentation to Commissioning Authority prior to check out. Once system is fully operational, Sub-subcontractor shall demonstrate system to Commissioning Authority and provide documentation for witness approval of system operation.
- 11) Telecomm Distribution Sub-subcontractor shall provide point to point documentation to Commissioning Authority prior to check out. Once system is fully operational, Sub-subcontractor shall demonstrate system to Commissioning Authority and provide documentation for witness approval of system operation.
- 12) Operate equipment and systems as required for functional performance testing.
- 13) Participate in fine-tuning and troubleshooting of system performance if either of these measures becomes necessary.
- 14) Provide complete operation and maintenance information and as-built drawings to the General Contractor for verification, organization, and distribution.
- 15) Provide training for the systems specified.

e. Controls Subcontractor:

- 1) Provide Commissioning Authority and Mechanical Subcontractor with controls system and wiring diagrams and narrative sequences of operation, in time for use in preparing the Functional Performance Test Procedures.
- 2) Review the Commissioning Plan, schedule, and Functional Performance Test Procedures. Provide input required to develop final plans and procedures that all commissioning team members accept as a fair means of compliance with commissioning goals and the project contract.
- 3) Participate in any required efforts to finalize sequences of operations with Owner, Designers, and Commissioning Authority.
- 4) Coordinate installation of controls system with equipment suppliers, mechanical Subcontractor, and electrical Subcontractor. Verify that coordination, installation, quality control, and final Subcontractor testing have been complete such that installed systems and equipment comply with construction documents.
- 5) Notify the Commissioning Authority, Designers and Owner's Representative as soon as possible of any system installation issues identified during construction that may compromise system control capability.
- 6) Participate in start-up and functional performance testing as required. This will require dedicated, full time support of the Commissioning Authority's functional performance testing efforts during commissioning.
- 7) Complete Pre-functional Performance Test Checklists and other supporting documentation as required to demonstrate completion of control system installation, point to point verification (including sensor calibration), start-up and testing. Reports will be stored in the General Contractors field office.
- 8) Participate in fine-tuning or troubleshooting of system performance if either of these measures becomes necessary.
- 9) Provide trend data in graphical format for a period of 15 consecutive days demonstrating that commissioned systems conform to the contract requirements as indicated in the record contract documents.
- 10) Provide the Commissioning Authority and Owner's Representative with final documentation for all installed conditions, including as-built

drawings and detailed narrative sequences of operation as determined during commissioning process.

f. Test, Adjust, and Balance Contractor.

- 1) Review the Commissioning Plan, schedule, and Functional Performance Test Procedures. Provide the input required to develop final plans and procedures.
- 2) Coordinate balancing activities with those of the Mechanical and Controls contractors. Verify that coordination, installation, quality control, and final Subcontractor testing have been completed to allow proper balancing work to be performed.
- 3) Notify the Commissioning Authority and Architect as soon as possible of any system installation or performance issues that may compromise the ability of the system to be balanced.
- 4) Participate in start-up and testing as required.
- 5) Complete Pre-functional Performance Test Checklists to verify completion of system balancing tasks. Reports shall be stored in the General Contractors field office.
- 6) Provide preliminary TAB report, indicating all actual field values recorded, to the Commissioning Authority, prior to initiation of functional performance testing.
- 7) Assist during the functional performance testing as required.
- 8) Participate in fine-tuning and troubleshooting of system performance if either of these measures becomes necessary.
- 9) Assist the Commissioning Authority during Final TAB verification of measured values as specified. Provide random recheck of 10 percent of the readings recorded in the preliminary Balancing Report as part of overall quality assurance efforts. The balancing report will be rejected if more than 20 percent of the rechecked items deviate more than 10 percent of the reading recorded in the report.

g. Commissioning Authority:

- 1) Perform commissioning submittal review to verify suitability and compliance with specifications.
- 2) Revise the Commissioning Plan as necessary to incorporate post-award conditions.

- 3) Provide supplemental Pre-Functional checklists documentation forms for all equipment to be commissioned with coordination of Subcontractor's specified documentation. Documentation will be coordinated by the Commissioning Authority and installed in a Field Commissioning Notebook (VELA System). That VELA System shall be maintained and managed the by General Contractor.
- 4) Organize meetings to finalize the controls system I/O Points List and Sequences of Operation. The meeting will be supported by the Architect and Controls Subcontractor.
- 5) Write Functional Performance Test Procedures and transmit to Subcontractors for review. After review period, changes will be incorporated and test will be performed.
- 6) Perform site observations to follow installation progress and to verify system installation quality and readiness for testing.
- 7) Observe the start-up activities and initial testing of equipment and systems as required, and review Subcontractor start-up documentation. Verify that the specified training schedule of Owner's personnel is provided.
- 8) Review submittal of all required Pre-functional Performance Test and start-up documentation provided by Subcontractors for completeness and reasonableness. This includes Controls Subcontractor's point to point checklists and TAB Subcontractor's completed preliminary TAB report prior to initiation of functional performance testing.
- 9) Provide supervision and coordination of TAB verification effort noted in this Section with TAB Subcontractor.
- 10) Direct and perform functional performance test with assistance from Subcontractors as required.
- 11) Review graphical data provided by Controls Contractor for the 15 day trend log period.
- 12) Issue project communication reports as necessary to document activities, progress, and deficiencies.
- 13) Assemble all test results and other required documentation into the final commissioning report.

C. Commissioning Process:

1. Coordination:

- a. Meetings:
 - 1) Commissioning issues pertaining to the overall construction process will be raised at the regular construction meetings. As the project advances into the system start-up and testing phases, commissioning coordination meetings will be scheduled on an as-needed basis. The lead entity in these commissioning meetings will be the Commissioning Authority. Minutes of these coordination meetings will be taken by the CA and distributed to the appropriate parties.
 - b. Scheduling:
 - 1) Commissioning related tasks noted throughout this Section are to be incorporated into the overall construction schedule. The intent is to define the milestones that must be achieved before the various commissioning activities can commence. The general flow of the commissioning process is as described in the text of the following paragraphs and in the Commissioning Implementation Flowchart provided in the final Commissioning Plan.
2. Preparation for Functional Performance Testing:
- a. Mechanical and Electrical System Installation:
 - 1) As installation of mechanical equipment, piping, and ductwork is completed, systems shall be cleaned and tested for integrity. Electrical connections shall be provided to each piece of equipment and control element installation and wiring is to be completed.
 - b. System Point-to-Point Check:
 - 1) The Controls, Fire Alarm, Security, and Door Access Sub- subcontractor shall perform point-to- point testing of all control components as specified in the construction documents. The procedures and methods for this testing will be reviewed by the Commissioning Authority. The checkout may be witnessed by the Commissioning Authority or other appropriate parties.
 - c. System Start-up:
 - 1) As described above under roles and responsibilities, each Subcontractor shall start up the equipment in their portion of the specifications. This task may be witnessed by the Commissioning Authority or other appropriate parties.
 - d. Test, Adjust, and Balance (TAB):

- 1) After the mechanical Subcontractor and controls Sub-subcontractor have installed complete systems, the TAB Subcontractor shall start balancing those systems. TAB activities require complete mechanical installation and complete control systems function, although control sequence verification may occur simultaneously. As long as a system is sufficiently independent of other systems, balancing work may commence prior to the completion of other systems.
- e. Verification of Completion:
 - 1) As each of the above successive steps is completed, each Subcontractor shall complete the appropriate Pre-functional Performance Test Checklists and related specified documentation. Together with the written statement of acceptance noted in specification, these forms will be each Subcontractor's statement that their work on the system is complete. The completion of Pre- functional Performance Test Checklists shall indicate that systems are installed, cleaned, integrity tested, wired lot power and control, started, balanced, and ready to commission. Completed Subcontractor start-up forms may be submitted in lieu of Pre- functional Performance Test Checklists, but are subject to prior approval by the Commissioning Authority
3. Functional Performance Testing:
 - a. Test Strategy:
 - 1) The basic strategy of functional performance testing is to verify the proper sequencing, operation, and performance of equipment and systems over a realistic range of operating conditions. Once the basic system start-up and operation is verified by the various subcontractors, the true functional performance testing can commence. For each subsystem, the control system shall be exercised to verify proper operation of all aspects of the control sequence. The installed capacities of each subsystem and its component equipment shall be verified as appropriate. Finally, the entire mechanical system control, Fire Alarm, Security, and Door Access sequence shall be tested and overall system capacity verified.
 - b. Test Procedures:
 - 1) Detailed functional performance test procedures shall be written by the Commissioning Authority for the overall mechanical and Fire Alarm system, each subsystem, and each component to be tested. These procedures shall be submitted to the Architect for distribution. Functional performance testing shall be performed by the Commissioning Authority. The Security and Door Access functional performance test

documentation shall be provided by the appropriate Sub-subcontractor. Test shall cover all sequences and components of the systems. Once systems have been complete and tested by Subcontractor, Commissioning Authority will verify correct operation.

4. Documentation:

a. Project Communication Reports and Log:

- 1) Project communication reports shall be issued by the Commissioning Authority to the Architect to inform involved parties and document the following issues:
 - a) Daily commissioning activities and progress on site.
 - b) Deficiencies identified in design and construction documents.
 - c) Deficiencies identified in installation.
 - d) Successful or unsuccessful results of functional performance testing.

b. Final Commissioning Report:

- 1) The Commissioning Authority will assemble the following documentation into a final report, to be submitted to the Architect:
 - a) Project Summary.
 - b) Pre-functional Performance Test Checklists and Supplemental Documentation (includes Controls point to point documentation and TAB preliminary report).
 - c) Functional Performance Test Procedures.
 - d) Functional Performance Test Records.
 - e) Project Communication Reports and Log.

c. Record Documentation:

- 1) The Commissioning Authority shall review the Record documentation for accuracy and completeness including construction drawings, shop drawings, operation and maintenance literature, and control system submittals. The documentation shall be organized by the General Contractor. These documents are a necessary reference for the Owner's operation and maintenance manual.

5. Training:

- a. The Owner's operation and maintenance personnel shall be formally trained in classroom sessions after distribution of operation and maintenance manuals and after equipment startup/commissioning. These sessions shall be performed as specified in pertinent sections and as noted in final Training Matrix.
- D. The functional performance test procedures include, but are not limited to the following:
1. Testing, adjusting, and balancing performance.
 2. Verification of all equipment performance.
 3. Verification of the performance of subsystems consisting of combinations of equipment (e.g. refrigeration cycle, pumps, chillers, cooling towers, and interconnecting piping).
 4. Verification of the performance of the automatic controls in all seasonal modes.
 5. Verification of the performance of the HVAC system as a whole.
 6. Verification of the performance of all life safety devices and systems as the interface with the HVAC systems.
 7. Verification of the performance of the Fire Alarm, Security and Door access systems.

1.7 SYSTEMS TO BE COMMISSIONED

- A. Final Assembly Building
1. Air Handling Units, Cooling and Process Systems
 2. Air Handling Units, Cooling and Gas Heating
 3. Terminal Units
 4. Exhaust Fans (General)
 5. Exhaust Fans (Special)
 6. Server/Elev. Room Air Conditioners (Split System)
 7. Compressed Air Distribution System
 8. Confined Space Ventilation System
 9. Aqueous Wash System
 10. Chillers

11. Fume Hoods
12. Lighting Control System
13. Fire Alarm System Testing
14. Waste Water PreTreatment System
15. Cooling Towers
16. Chilled Water Pumps
17. Condenser Water Pumps
18. Air Compressors

1.8 FIELD COMMISSIONING NOTEBOOK (VELA SYSTEM)

- A. The Field Commissioning Notebook (VELA System) will be used to identify and track all pertinent commissioning documentation required during the installation phase. This Notebook shall be maintained by the Contractor on site and will be made available to all Subcontractors for their use. The Notebook provides a central location for the Commissioning Authority to identify, copy, and organizes all pertinent information and will include the following format.
 1. Summary describing Notebook contents and use.
 2. Copy of Commissioning Plan for Contractor field reference.
 3. Listing of all specification documentation requirements listed by specification section, with sign off spots for appropriate parties.
 4. Tabs for each specification section with copies of pre-functional checklists provided by coordination of Subcontractors and Commissioning Authority for Contractor completion and space for related contractor-supplied documents.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION

3.1 GENERAL

- A. Operating equipment and systems shall be tested in the presence of the Owner's Commissioning Authority and Architect to demonstrate compliance with specified requirements.

1. Notify Commissioning Authority and Architect, in writing, three (3) working days prior to tests scheduled under requirements of this Section.
 2. Testing shall be conducted under specified design operating conditions as recommended or approved by Commissioning Authority and Architect.
- B. Functional Performance Testing shall be completed and accepted by Owner as a condition of Substantial Completion.
- C. All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each subsystem, followed by entire system, followed by inter-ties to other major systems.
- D. All special testing materials and equipment shall be provided by Contractor.
- E. Acceptance Documentation: A copy of the Commissioning Plan and Functional Performance test results shall be included with each copy of the Operations and Maintenance Manual.

3.2 ACCEPTANCE PROCEDURES

- A. Prior to functional performance testing of each system, the Commissioning Authority shall observe and verify that the physical installation of components and systems being tested is substantially installed in accordance with the contract documents.
- B. Contractors Tests:
1. System shall be checked for proper installation, shall be adjusted, and shall be calibrated to verify that it is ready to function as specified.
 2. All system elements shall be checked to verify that they have been installed properly and that all connections have been made correctly.
 3. All discrete elements and sub-systems shall be adjusted and shall be checked for proper operation.
 4. Start-up and Operational Tests shall be complete, with all required pre-functional performance testing documentation included in the Field Commissioning Notebook (VELA System) submitted for review by Commissioning Authority within five (5) days of each activity, prior to starting Functional Performance Acceptance Tests.
- C. Functional Performance Tests:

1. Objective of these tests is to demonstrate that system is operating and complying with specified performance requirements.
 2. Functional Performance Tests shall be performed on complete system. Each function shall be demonstrated on paragraph-by-paragraph basis of Commissioning Authority written test procedure, developed to demonstrate conformance to requirements of Contract Specifications.
 3. Actual testing program shall be conducted in accordance with prior approved procedures and shall be documented as required herein.
- D. The functional performance testing process shall be accomplished for all equipment, subsystems, systems, and system interfaces. All must be tested for acceptances, and there shall be a separate checklist for each to ensure documentation specific to each is complete.
- E. Each system shall be operated through all modes of system operation (for example, seasonal, occupied, unoccupied, warm-up, cool-down, etc, as applicable) including every individual interlock and conditional control logic, all control sequences, both full-load and part-load conditions, and simulation of all abnormal conditions for which there is a specified system or controls response.
- F. Temporary upsets of systems, such as distribution fault, control loss, setpoint change, equilibrium upset, and component failure, shall be imposed at different operation loads to determine system stability and recovery time.
- G. When the functional performance of all individual systems has been proven, the interface or coordinated responses between systems shall be checked. The systems involved may be within the overall HVAC work, or they may involve other systems, such as emergency systems for life safety.
- H. Corrective Measures: If acceptable performance cannot be achieved, then necessary corrective measures shall be carried out by the Contractor. Every check or test for which acceptable performance was not achieved shall be repeated after the necessary corrective measures have been completed. This re-testing process should be repeated until acceptable performance is achieved.
- I. Equipment shall not be accepted by Owner, and final payment shall not be made by Owner, until standard of performance is met.
- J. Systems shall be first tested as independent building systems, followed by tests of systems tied into existing systems.
- K. Upon Contractor's completion of the requirements of the Commissioning Plan and the successful completion of the Performance Period, and receipt of the required

documentation, the Commissioning Authority shall provide the Owner with a statement of acceptable performance. Receipt of the acceptable performance statement by the Owner shall be a condition of Final Completion of the project.

3.3 TRAINING AND INSTRUCTION

- A. Training and instruction of Owner's personnel is a part of the commissioning process and essential for the proper operation of the facility. The Contractor shall coordinate commissioning activities with training of Owner's personnel. Detailed requirements for training and instruction are contained in other sections of the Contract Documents including, but not limited to, Section 01 78 50, Division 23, and Division 26.

END OF SECTION 01 91 13

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - Demolition and removal of selected portions of building or structure.
 - Demolition and removal of selected site elements.
 - Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
Inspect and discuss condition of construction to be selectively demolished.
Review structural load limitations of existing structures.
Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, dust control, erosion control and for vibration control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
Interruption of utility services. Indicate how long utility services will be interrupted.
Coordination for shutoff, capping, and continuation of utility services.
Use of elevator and stairs.
Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Pre-demolition Photographs and Video: Submit before Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect/Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
If suspected hazardous materials are encountered, do not disturb; immediately notify Architect/Engineer and Owner.
- E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by ten feet or more.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, plumbing, civil or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect/Engineer.
- E. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and videotapes.

Comply with requirements specified in Div 01 "Photographic Documentation."

Inventory and record the condition of items to be removed and salvaged. Provide photographs and video of conditions that might be misconstrued as damage caused by salvage operations.

Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

Comply with requirements for existing services/systems interruptions specified in Div 01 "Summary."

- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

Owner will arrange to shut off indicated services/systems when requested by Contractor.

Arrange to shut off indicated utilities with Owner and utility companies.

If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

Disconnect, demolish, and remove utilities, fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

- a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - c. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - d. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - e. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

Comply with requirements for access and protection specified in Div 01 "Temporary Facilities and Controls."

- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

Cover and protect furniture, furnishings, and equipment that have not been removed.

Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Div 01 "Temporary Facilities and Controls."

- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each level or tier before disturbing supporting members on the next lower level.

Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

Maintain adequate ventilation when using cutting torches.

Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

Dispose of demolished items and materials promptly. Comply with requirements in Div 01 "Construction Waste Management and Disposal."

- B. Work in Historic Areas: Selective demolition may be performed only in areas of the Project that are not designated as historic. In historic spaces, areas, and rooms or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling".
- C. Removed and Salvaged Items:
 - Clean salvaged items.
 - Pack or crate items after cleaning. Identify contents of containers.
 - Store items in a secure area until delivery to Owner.
 - Transport items to Owner's storage area designated by Owner.
 - Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - Clean and repair items to functional condition adequate for intended reuse.
 - Pack or crate items after cleaning and repairing. Identify contents of containers.
 - Protect items from damage during transport and storage.
 - Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect/Engineer, items may be removed to a suitable, protected storage location during selective demolition, cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - Do not allow demolished materials to accumulate on-site.
 - Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

Comply with requirements specified in Div 01 "Construction Waste Management and Disposal."

- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 05 12 00 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Features:
 - 1. Structural steel fabrication and erection required for completion of the work.
- B. Related Sections:
 - 1. 01 33 00 – Submittal Procedures
 - 2. 01 45 00 – Structural Testing, Inspection, and Quality Assurance
 - 3. 05 31 00 – Steel Decking

1.3 REFERENCE STANDARDS

- A. General: Comply with the provisions of the latest versions of the publications listed below except as otherwise shown or specified.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC Steel Construction Manual
 - 2. AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts
 - 3. AISC 303 Code of Standard Practice for Steel Buildings and Bridges, as modified herein
 - 4. AISC 341 Seismic Provisions for Structural Steel Buildings.
 - 5. AISC 360 Specifications for Structural Steel Buildings
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A6 General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
 - 2. ASTM A36 Structural Steel
 - 3. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

4. ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip
5. ASTM A307 Carbon Steel Externally and Internally Threaded Standard Fasteners
6. ASTM A325 High-Strength Bolts for Structural Steel Joints
7. ASTM A441 High-Strength, Low-Alloy Structural Manganese-Vanadium Steel
8. ASTM A490 Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
9. ASTM A500 Grade B Cold-Formed Welded and Seamless Carbon Steel Structural Tubing
10. ASTM A501 Hot-Formed Welded and Seamless Carbon Steel Structural Pipe
11. ASTM A572 High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
12. ASTM A588 High-Strength Low-Alloy Structural Steel with 50,000 PSI Minimum Yield Point to 4-Inch Thickness
13. ASTM A913 High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by the Quenching and Self-
14. ASTM A992 Standard Specifications for Steel for Structural Shapes for Use in Building Framing
15. ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
16. ASTM F1852 Standard Specifications for "Twist-Off" Type Tension Control

D. American Welding Society (AWS):

1. ASTM A2.4 Welding Symbols
2. ASTM A3.0 Terms and Definitions
3. ASTM A5.1 Specifications for Mild Steel Covered Arc Welding Electrodes
4. ASTM A5.5 Specification for Low-alloy Steel Covered Arc Welding Electrodes
5. AWS A5.17 Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding
6. AWS A5.20 Specification for Carbon Steel Electrodes for Flux Cored Arc Welding
7. AWS A5.23 Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding
8. AWS D1.1 Structural Welding Code - Steel
9. AWS D1.4 Reinforcing Steel Welding Code, including Metal Inserts and Connections in Reinforced Concrete
10. AWS D1.8 Structural Welding Code - Seismic Supplement

1.4 STRUCTURAL DRAWINGS

- A. The Contract Documents are complementary. The Structural Drawings shall not be considered a stand-alone document. The Contractor shall use the Structural Drawings in conjunction with all of the Contract Documents, including but not limited to the Architectural, Civil, Mechanical, and Electrical Drawings. Locations and geometry of steel members not provided in the Structural Drawings shall be determined from these other Drawings.
- B. Delete Sections 2.1 and 2.2 from AISC 303 and replace with the following:
 - 2.1 Definition of Structural Steel
Structural Steel shall consist of the elements of the structural frame that are shown and sized in the structural Design Drawings.
 - 2.2 Other Steel, Iron, or Metal Items
Structural Steel shall not include other steel, iron, or metal items that are not shown and sized in the structural Design Drawings.

1.5 QUALITY ASSURANCE

- A. Fabricator/Erector: Must have plant, facilities, and personnel sufficient to fabricate and/or erect structural steel indicated on the drawings. Must have minimum of 5 years' experience with a record of successful in-service performance and be able, upon request, to show framing of size, materials, and scope similar to work of this contract. Must demonstrate sufficient production capacity to provide structural steel indicated on the drawings.
- B. Material: Provide only structural steel certified as conforming with specified requirements and fabricate specifically to the requirements of this contract. Material that does not conform to the requirements of this contract may be rejected at any time.
- C. Charpy V-Notch Testing: Testing shall be in accordance with ASTM A6, Supplement S30, where this testing is specifically required.
- D. Allowable Tolerances: Unless otherwise specified or noted on drawings or in this specification, provide structural steel work in accordance with the following minimum tolerances:
 - 1. Fabrication Tolerances: In accordance with requirements of AISC specification unless noted otherwise and as required to maintain the erection tolerances specified herein.
 - 2. Erection Tolerances: In accordance with requirements of AISC. The Contractor alone shall be responsible for the correct fitting of all structural members and for the elevation and alignment of the finished structure. Any adjustment necessary in the steel frame because of discrepancies in elevations and alignment shall be the responsibility of the Contractor.
- E. Connection Identification: Each person installing connections shall be assigned an identifying symbol or mark, and all shop and field connections shall be so identified so that the Owner's Testing Agency can refer to the person making the connection.

- F. Test and Inspections: Work is subject to special testing and inspection. Refer to Section 01 45 00, "Structural Testing, Inspection, and Quality Assurance." The Fabricator/Erector shall provide the Owner's Testing Agency and the Architect/Engineer access to places where material is being fabricated/erected. Notice shall be given for joints requiring inspection for proper end preparation, root opening, etc., prior to welding.
- G. Engineering by Contractor: The Contractor shall engage a structural or civil engineer, licensed in the state where the project exists, to review and design, where needed, for the support of hoisting equipment, welding machines, and other construction imposed loads, for the stacking of materials such as steel decking, etc., and for temporary bracing, shoring, and other safety related construction procedures where required. It is the Contractor's responsibility to obtain and pay for such engineering services.
- H. Welder Qualifications: Each welder performing work on this project shall be qualified before commencement of welding on this project in accordance with the American Welding Society, AWS D1.1, and the Washington Association of Building Officials (WABO). Copies of each welder's qualification records shall be made available to the Architect and Owner's Testing Agency for review.
- I. Inspections: A qualified inspector under the requirements of the building code shall continuously inspect field welds.
- J. Bolting Quality Assurance: The bolt supplier shall visit the project site or fabrication plant if bolt installation is to be performed during the bolting start-up to demonstrate proper installation procedures and verify inspection procedure with the Contractor, Erector, and the Owner's Testing Agency. The Contractor shall distribute written verification of the visit to the attending parties, Owner, Architect, and Owner's Structural Engineer.
- K. Shop Testing by Contractor: The Contractor shall perform ultrasonic testing and visual inspection of all plate material and rolled sections greater than 1-1/2 inches in thickness and located at welded connections for discontinuities prior to fabrication. The test area is defined as a zone up to 6 inches away from the weld in the connection. These tests shall be in addition to the ultrasonic testing of all complete joint penetration welds that will be performed by the Owner's Testing Agency. The Contractor's testing shall be submitted to the Architect/Engineer and Owner's Testing Agency. All costs associated with this testing shall be borne by the Contractor.
 - 1. Ultrasonic Testing: Conduct in accordance with ASTM A435 with the following modifications and supplementary requirements:
 - a. Supplementary Requirements S1, requiring 100% scanning of the test, are to be included.
 - b. Section 5.2, Acceptance Standards, is supplemented with the following provision: "The fabricator, insofar as practical, may reposition a rejected plate so that rejectable defects are not located in a test area."

- L. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- M. Pre-Construction Conference: Schedule a job conference to review the Structural Documents prior to development of shop drawings. The conference shall be attended by all pertinent parties, which is, at a minimum, to include the Fabricator, Erector, Contractor, Owner's Testing Agency, and Structural Engineer.

1.6 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00, "Submittal Procedures."
- B. Shop Drawings: Submit shop drawings for review prior to commencing any fabrication of structural steel.
 - 1. Show framing layout, dimensions, connections with adjoining materials and construction, finishes, welds, bolts and fasteners, anchoring, and all fabrication or erection accessories required.
 - 2. Specify field welds, cuts, holes, and fasteners.
 - 3. Verify all dimensions and correlate with adjoining construction and materials.
 - 4. Indicate size, type, and grade of all members.
 - 5. Include with each detail shown on the shop drawings a reference to the Architect's and Engineer's drawings and details, where applicable.
 - 6. Prior to shop drawing submittal, the Contractor and Fabricator shall review the drawings for obvious drafting and detailing errors.
 - 7. The Fabricator shall either employ or retain a structural engineer licensed in the state where the project exists ("Fabricator's Engineer"). All structural steel shop drawings shall be completed under the direct supervision and review of the Fabricator's Engineer.
 - 8. The Fabricator's Engineer shall seal, date, and submit a letter simultaneously with the first submittal of structural steel shop drawings stating the following: "All structural steel shop drawings prepared for this project either have been or will be prepared under my direct supervision and review."
 - 9. Before being submitted to the Architect, the shop drawings showing proposed connections shall be reviewed by the erector to confirm that the intended connection configurations are acceptable to the erector. The erector shall provide a letter stating that the connections satisfy their guidelines for erection. This letter should be submitted to the Architect with the first submittal set of shop drawings.
 - 10. Structural steel shop drawings will not be reviewed by the Architect until letters from the Fabricator's Engineer and erector are received.
 - 11. Connection Calculations

- a. Submit calculations for framed beam connections and other connections not completely detailed on the drawings. Calculations shall be sealed by the Fabricator's Engineer.
 - b. Calculations shall be submitted with the first shop drawing submittal and shall be cross-referenced with all shop drawing submittals
 - c. Shop drawings will not be reviewed without the submittal of coordinated connection calculations.
- C. One month prior to commencing fabrication, submit Fabricator's quality assurance procedures to the Architect, Engineer, Owner, and Owner's Testing Agency.
- D. Indicate welded connections on shop drawings using standard AWS welding symbols. Show all welded connections with details showing size, length, location, and type of welds.
- E. Mill Reports: Submit three copies of certified mill reports indicating heat and melt numbers of steel. Mill reports are to be submitted for record only and will not be reviewed:
 1. If test reports are not submitted or test reports cannot be identified with material proposed for use in the work, then secure and perform structural tests on 5% of all such unidentified steel.
 2. Contractor shall furnish all such material for testing and pay for all such tests.
 3. Furnish Owner, Architect, and Structural Engineer certified copies and Fabricator one certified copy of all test reports.
- F. Inspection Test Reports: Upon request, submit to Architect copies of Contractor's ultrasonic testing reports.
- G. Placement Plans: Submit placement plans and details as required for the satisfactory placing, connection, and anchorage of all structural members.
- H. Survey Reports: Promptly submit an accurate survey of actual elevations and locations of base plates and anchor bolts, and alignments as well as elevations of all steel as noted on the drawings. The report shall specify that the location of the structural steel is acceptable for plumbness, level, and alignment within the specified tolerances.
- I. Certification: Submit manufacturer's certified test reports on load indicator washers and/or tension control bolts on at least three samples from each heat supplied to conform to tolerance range.
- J. Welding Procedures: For welded joints prequalified and non-prequalified by AWS D1.1, submit a description of welding procedures proposed for use on structural steel a minimum of one month prior to use. Furnish joint welding procedure qualification tests as required by AWS D1.1 for non-prequalified welded joints. Welding procedures shall be reviewed by the

Owner's Testing Agency, and an approved copy shall be forwarded to the Structural Engineer.

K. Manufacturer's Certification is required as follows:

1. Bolts, Nuts and Washers: Furnish complete manufacturer's mill test reports conforming to ASTM A325, Type 1, or ASTM A490. Markings and chemistry must also comply with the specification. Certification numbers must appear on product containers and correspond to certification numbers on mill test report to be accepted. Mill test report must be supplied to both purchaser and Owner's Testing Agency.
2. Filler material for welding.

L. Erection Plan: Submit a comprehensive erection plan including sequencing, crane requirements, means and methods, temporary shoring and bracing, safety procedures, etc. The erection design and calculations shall be prepared by a structural engineer, licensed in the state of the project. The erection plan is to be submitted solely for the purpose of confirming that the Contractor has complied with the specification requirements to prepare an erection plan. The erection plan will not be reviewed.

M. Product Data: For shop primers, include manufacturer's technical information including basic materials analysis and application instructions.

N. Structural Calculations: Submit structural calculations for connections that are designed by the Contractor as required in the construction documents. These calculations shall be prepared by a qualified licensed professional engineer registered in the state where the project is located.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with the requirements of the general conditions and of ASTM A6, including the following.

B. Store materials in a manner to permit easy access for inspection and identification.

1. Keep steel members off the ground, using pallets, platforms, or other supports.
2. Protect steel members and packaged materials from corrosion and deterioration.

C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures at no additional cost to the Owner.

D. Columns, beams, girders, and other members that are to receive sprayed-on fireproofing shall be free of loose rust, heavy mill scale, oil, dirt, or other foreign substances prior to application of fireproofing materials.

E. All fasteners shall be stored and protected in accordance with the current requirements of the "Specification for Structural Joints using ASTM A325 or A490 Bolts."

1.8 JOB CONDITIONS

- A. Temporary Bracing: Temporary bracing and guylines shall be provided to adequately protect all persons and property and to ensure proper alignment.
- B. Temporary Floors: All temporary flooring, planking, and scaffolding necessary in connection with the erection of the structural steel or support of erection machinery shall be provided. The temporary floors or use of steel decking shall be as required by law and governing safety regulations. The reduced load capacity of members and assembly, especially the floor and roof beams and girders due to their unbraced condition prior to welding of steel deck and completion of concrete slabs, is hereby noted and shall be considered.
- C. Holding and Protection: In assembling and during welding, the component parts shall be held with sufficient clamps or other adequate means to keep parts straight and in close contact. In welding, precautions shall be taken to minimize "lock-up" stress and distortion due to heat. In windy conditions, welding shall be done only after adequate wind protection is furnished and set up and as specified in the AWS.

1.9 CONDITION OF STEEL

- A. Pre-Fireproofing Inspection: The Contractor, structural steel erector, sprayed-on fireproofing applicator, and the Owner's Testing Agency shall conduct a visual inspection of all structural steel prior to receiving fireproofing. The purpose of this inspection is to check for foreign substances on the surfaces, which could impair adhesion. Any cleaning that may be necessary as a result of this inspection shall be done at no additional cost to the Owner.
- B. Application of the sprayed-on fireproofing will not commence until all steel surfaces have been accepted by the sprayed-on fireproofing subcontractor and material manufacturer. No additional compensation shall be granted to the Contractor, structural steel erector, or fireproofing applicator should it be determined at a later date that foreign substances, which were allowed to remain on the steel surfaces, will have a detrimental effect in obtaining total adhesion in accordance with specification Section 07 81 00, "Applied Fireproofing."

1.10 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)

- A. Where items are indicated on the drawings as being AESS, the fabrication, erection, and finishing of these items shall be in conformance with the AISC Code of Standard Practice for Steel Building and Bridges, Section 10.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Carbon Steel and High-Strength Low-Alloy Steel: Provide steel shapes, plates, and bars of structural quality, sizes, and standards noted on drawings for use in welded and bolted

construction. Steel manufactured by the acid bessemer process shall not be used for structural purposes. Steel that, in the opinion of the Owner's Testing Agency, is badly corroded or physically damaged shall not be incorporated in the work until the Owner's representatives, Contractor, Erector, and Fabricator have agreed to allow the installation.

- B. Primer: Fabricators standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer.
 - 1. Weldable primers shall not be used.
 - 2. Where other coatings (intumescent paint, architectural paint, etc.) are to be applied, use the appropriate primer as required per the architectural coatings specifications and as required to be compatible with these other coatings.
- C. Standard Fasteners: Low-carbon steel externally and internally threaded fasteners conforming to requirements of ASTM A307, Grade A. Provide hexagonal heads and nuts for all connections. Include lock washers under nuts or self-locking nuts.
- D. High-Strength Fasteners: Quenched and tempered steel bolts and nuts conforming to requirements of ASTM A325 or ASTM A490.
 - 1. Provide heavy hexagonal head bolts and nuts, and hardened steel washers.
 - 2. Load indicator washers conforming to ASTM F959 or tension control bolts conforming to ASTM F1852 shall be used.
 - 3. Any proposed substitutions must have documentation submitted for review and approval of the Structural Engineer one month prior to construction.
 - 4. Acceptable tension control bolt suppliers shall be Lejuene Bolt Company/Lakeview, Minnesota, and Bristol Industries/Brea, California, or approved equal.
- E. Weld Electrodes: See AWS D1.1 and AWS D1.8 for requirements. See Structural General Notes for filler metal Charpy V-notch impact toughness requirements.
- F. Headed Shear Connector Studs, Deformed Bar Anchors: Refer to Section 05 31 00, "Steel Decking," for specific requirements at composite floor deck.
 - 1. Headed Shear Connector Studs: Shall be Type B in accordance with AWS D1.1 and comply with ASTM A108, Grade 1015 or 1020; of dimensions complying with AISC specifications and the contract drawings; through deck stud welded shear connectors. Install in such a manner as to provide complete fusion between the end of the stud and structural steel base material.
 - 2. Deformed Bar Anchors: ASTM A496 of dimensions per plan. Install in such a manner as to provide complete fusion between anchor and base material.
 - 3. All steel stud/anchors welded to steel beams or plates shall be "Tru-weld studs," Division of Tru-Fit Screw Products Corporation, Cleveland, Ohio; "Nelson Stud," Division of Gregory Industries, Inc., Lorain, Ohio; or approved equal. All stud anchors shall be automatically end-welded in shop or field with equipment recommended by manufacturer of studs and anchors.

4. All welded connectors are to be end welded in accordance with AWS D1.1. Base metal is to be clean, dry, and free of paint, rust, oil, scale, or other contaminants. Welding should not be done when the base metal temperature is below 0°F.
 5. Where threaded studs are specified, the stud shall utilize a reduced weld base so that the weld flash will match the diameter of the fastener.
- G. Drilled-in-Concrete Anchors: Refer to structural drawings.
- H. Slab Edge/Deck Supports: Refer to Section 05 31 00, "Steel Decking," for specific requirements at composite floor deck.
1. Provide additional structural steel support framing for steel deck where normal deck bearing is precluded by column flange plates or other framing members.
 2. The Contractor shall make specific provisions to provide the necessary framing materials at slab and roof edge conditions. The Contractor shall provide and install all gage metal edge closures where required by the plans and specification and shall coordinate shoring requirements at composite slab edges. The Contractor shall provide and install all structural steel bent plate edge closures or structural steel edge materials and any corresponding bracing or shoring where required by the plans and specifications.
- I. Grout: Refer to Structural General Notes.
- J. Other Materials: Provide all incidental and accessory materials, tools, methods, and equipment required for fabrication and erection of structural steel framing as indicated on drawings. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- K. General: Miscellaneous materials or accessories not listed above shall be provided as specified herein under the various items of work and as indicated on the drawings or required for good construction practice.

2.2 FABRICATION

- A. Fabricate all steel in accordance with requirements of AISC specifications and in accordance with details indicated on the drawings or as approved on shop drawings.
1. Identify all steel at mill showing ASTM standard grade.
 2. Identify each piece with an erection mark corresponding to identifications noted on erection drawings.
- B. Materials shall be properly identified with an erection mark corresponding to identifications noted on erection drawings and match-marked where field assembly requires. The sequence of shipments shall be such as to expedite erection and minimize the field handling of material.
- C. Cutting: All holes and openings must be approved by the Owner's Structural Engineer.

1. Do no flame cutting by hand of openings greater than 1/2 the depth of the member, unless approved by the Engineer.
 2. All flame-cut holes shall be smoothed by chipping, planing, or grinding members to required AISC tolerances.
 3. Sharp bends or kinks will not be allowed.
 4. Flame cutting by hand will not be allowed for holes at connections.
- D. Milled Surfaces: All milled surfaces shall be completely assembled or welded before milling. Milled surfaces are to provide full contact bearing for the entire cross section.
- E. Beams, girders, and trusses shall be upward cambered where indicated on the drawings. For beams, girders, and trusses without specified cambers, fabricate members so that after erection, any minor camber due to rolling or fabrication is upward.
- F. Connections Designed on the Structural Drawings:
1. The Contractor shall not deviate from these designs unless approved by the Architect and Engineer.
 2. Connections shown on the drawings may eliminate certain methods of erection.
 3. If the Contractor elects a method of erection that requires a change of some of the connections, it must be approved by the Architect and Engineer.
- G. Combination of bolts and welds shall not be used for stress transmission in the same faying face of any connection without prior approval by the Structural Engineer.
- H. For stud anchor and deformed bar anchor welding, the area where the anchor is to be attached shall be made free of all foreign material such as rust, oil, grease, paint, galvanizing, etc.
1. When the mill scale is sufficiently thick to cause difficulty in obtaining proper welds, it shall be removed by grinding or sandblasting.
 2. Use automatic end welding of headed stud shear connections in accordance with manufacturer's printed instructions.
- I. Welding processes other than shielded metal arc, flux core arc, and submerged arc may be used, provided procedure qualification tests in accordance with the American Welding Society are made for the intended application of all such processes.
- J. Built-up sections assembled by welding shall be free of warpage, and all faces shall have true alignment.
- K. Types of Welds: Required weld types are indicated by symbols on drawings; characteristics of welds shall be in accordance with standard specifications or codes as applicable; each welder shall mark his identification symbol on his work.
- L. Preparation of Steel Surfaces to be Welded: Prepare edges to be joined by welding as indicated on drawings and in accordance with AWS D1.1. All welds are to be made to clean

steel. Remove all coatings, galvanizing, grease, scale, rust, and other foreign matter at locations that are to be welded in accordance with AWS D1.1.

- M. Reinforcing Steel: Welding or tack welding of reinforcing bars to other bars or plates, angles, and similar shapes is prohibited, except where specifically shown on plans or approved by the Structural Engineer; where required, use electrodes in accordance with requirements of AWS D1.4/12.1 and the Structural General Notes.
- N. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
- O. Detailing of connections, welding sequences, and preheat methods shall be such as to minimize restraint and the accumulation and concentration of through thickness strains due to weld shrinkage.
- P. At welded joints that are not hidden by architectural finish materials, remove projecting ends of runoff tabs, backer bars, and any other erection aids, and grind flush with edges of plates.
- Q. Cleaning of Steel Surfaces: Clean all surfaces of oil, grease, loose rust, loose mill scale, and other foreign matter present in sufficient quantities to impair bond of spray fireproofing or other specified coatings.
- R. Steel Stud and Deformed Bar Anchors:
 - 1. All anchors shall be automatically end-welded in the shop or field with equipment recommended by the manufacturer of the studs and by qualified welders. Steel stud material, welding, and inspection shall be in accordance with AWS D1.1. End-weld in such a manner as to provide complete fusion between the end of the stud and the plate. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate.
 - 2. Tests and Inspections by the Contractor: Provide testing of deformed bar anchors and studs in accordance with AWS D1.1.
 - 3. Refer to Section 05 31 00, "Steel Decking," for specific requirements at composite floor deck.
- S. Shop Priming:
 - 1. Shop prime steel surfaces except the following:
 - a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - b. Surfaces to be high-strength bolted with slip-critical connections.
 - c. Surfaces to be welded.
 - d. Surfaces to receive sprayed-on fireproofing.
 - 2. Surface Preparation: Clean surfaces to be primed. Remove loose rust, loose mill scale, and splatter, slag, or flux deposits. Prepare surfaces to SSPC specification as follows:

- a. SSPC-SP3 "Power Tool Cleaning".
3. Priming: Immediately after surface preparation, apply primer according to the manufacturer's instruction and at the rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - b. Apply two coats of paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

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

3.2 ERECTION

- A. General: Erect structural steel framing in accordance with governing codes and specifications. Conform to configurations and connections as shown in the documents.
- B. Bracing: Provide temporary shoring and bracing members as required and according to the AISC Code of Standard Practice.
- C. Column Base and Bearing Plates: Align attached column bases and bearing plates for beams and similar structural members. Set loose column bases and bearing plates. Grout solid with non-shrink grout as specified.
- D. Field Assembly: Accurately assemble structural framing to lines and elevations indicated within specified or noted tolerances.
 1. Align and adjust various members of framing system prior to fastening.
 2. Prior to assembly, clean bearing surfaces and surfaces that will be in permanent contact.
 3. Splice structural members only where indicated or where approved.
 4. Cut holes by drilling only.
 5. Fasten splices of compression members after bringing abutting surfaces completely into contact.
 6. Make all field connections by high-strength bolting or welding, unless otherwise noted.
 7. Unless noted otherwise, tighten and leave erection bolts in place after welding. Where high-strength bolts are required, provide identified and marked bolts.

8. Do not field cut or alter structural members without the written approval of the Structural Engineer.
 9. Do not use gas-cutting torches for correcting fabrication errors in structural framing.
 10. Finish gas-cut sections equal to a sheared appearance.
- E. Furnish shim plates or develop fills where required to obtain proper fit and alignment.
- F. Non-Fusible Backing Materials: The use of non-fusible backing materials, including ceramic and copper, in accordance with the structural notes, is permitted only with satisfactory welder qualification testing performed using the type of backing proposed for use, using the test plate shown in AWS D1.1, Figure 4.21, except that groove dimensions shall be as provided in the weld procedure specification. Welders using these backings shall be prequalified per AWS.
- G. Composite Construction: This building utilizes composite (concrete and structural steel) construction for various beams and columns. Careful sequencing of steel erection and concrete placement is recommended.
- H. Connections: No welding or bolting shall be done until as much of the structure as will be stiffened by the welding or bolting has been properly aligned.
- I. Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged shall be reamed up to a maximum of 1/16 inch larger to admit bolts. Burning, drifting, and reaming may be used to align unfair holes in members only after approval by the Owner's Structural Engineer.
- J. Mutilate threads or use lock nuts for unfinished bolts to prevent nuts from backing off. Draw unfinished bolt heads and nuts tight against the work.
- K. Establish required leveling and plumbing measurements on the mean operating temperature of the structure of 65°F unless noted otherwise. Make allowances for differences between temperature at time of erection and mean temperature at which the structure will be maintained when completed and in service.
- L. The steel erector shall leave the steel clean of oil or other contaminants as outlined under Part 2 of this Specification.
- M. Touch-up Priming: Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop primer. Apply primer to exposed area with the same material as used for shop priming. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

3.3 ERECTION TOLERANCES AND SURVEY

- A. Plumb, level, and align individual pieces in accordance with the requirements of the "AISC Code of Standard Practice for Steel Buildings and Bridges."

- B. Field Survey: Make an accurate survey of alignments and elevations of all steel members as noted on the drawings.
1. During construction of the steel frame, the Contractor shall survey the column locations and splice elevations as each column tier is erected. Submit survey reports indicating this information within 24 hours for review prior to erecting the subsequent tiers.
 2. Permanent benchmarks shall be established by a registered professional engineer employed by the Contractor in accordance with the requirements of contract documents.
 3. Should locations vary beyond the allowable tolerances, notify the Architect/Engineer and take necessary corrective measures and modify details and/or procedures as required and approved.

3.4 HIGH-STRENGTH BOLT INSTALLATION

- A. General: Supply and install all high-strength bolts, nuts, and washers in conformance with the requirements of the current edition of "Specification for Structural Joints using ASTM A325 or A490 Bolts," except that the installation of "turn-of-nut tightening" will not be accepted.
1. All high-strength bolts, both friction and bearing type, shall be installed in accordance with Paragraph 8(d)(4), "Direct Tension Indicator Tightening," unless noted otherwise on the drawings.
 2. Load-indicator washers (LIW) or tension control bolts (TCB) shall be used as the authorized direct tension indicator.
 3. Load-indicator washers per ASTM F959 shall be supplied and installed in accordance with the manufacturer's written procedures.
 4. Tension control bolts shall be supplied and installed providing shearing of the bolt tip in accordance with ASTM F1852 and in accordance with the manufacturer's written procedures.

END OF SECTION 05 12 00

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SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Sections include the following:
 - 1. Division 26 Section "Medium-Voltage Cables" for single-conductor and multi-conductor cables, cable splices, and terminations for electrical distribution systems operating at 13.8 KV.
 - 2. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Prysmian Cables and Systems.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70. Stranded all sizes.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW and SO.
- D. Multi-conductor Cable: Comply with NEMA WC 70 for armored cable, Type AC, metal-clad cable, Type MC with ground wire. The use of Type AC and Type MC cable shall be limited to special situations such as whips to lighting fixtures or as approved on shop drawings or where approved by the Contract Manager.
- E. Tray cable multi-conductor: Type TC list UV resistant certified by the manufacturer.
- F. Tray cable single conductor: Type CT listed UV resistant certified by the manufacturer.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other manufacturers with equal products:

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

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper, stranded, AWG #12 and larger.
- B. Branch Circuits: Copper, stranded, AWG #12 and larger.
- C. Control Circuits: Copper, stranded, AWG #14 and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN- THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- F. Feeders in Cable Tray: Type THHN-THWN, single conductors or other insulation: listed for use in cable tray with approval of Boeing Engineering.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

- J. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- K. Cord Drops and Portable Appliance Connections: Type SO, multi-conductor stranded copper hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- L. Control Circuits in Control Panels: Type MTW stranded copper, minimum size AWG #14.
- M. Control Circuits in Switchgear: Type SIS stranded copper.
- N. In cable tray #1/0 and above Type CT single conductor or Type TC-ER multi-conductor
- O. In cable tray smaller than #1/0 Type TC-ER multi-conductor

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, in offices and finished spaces unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

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

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: General Contractor shall engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each termination and splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Ground bonding common with lightning protection system.
 - 3. Static grounding for aircraft production.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Ground rings.
 - 4. Grounding arrangements and connections for separately derived systems.
 - 5. Grounding for sensitive electronic equipment.
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Field quality-control reports.
- E. Operation and Maintenance Data: For grounding 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. Instructions for periodic testing and inspection of grounding features at test wells and grounding connections for separately derived systems based on NETA MTS.

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

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.
- D. For static grounding, consult Boeing Site Services Electrical Engineering for requirements.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Bonding Cable: 28-kcmil, 14-strands of No. 17 AWG conductor, 1/4-inch in diameter.
 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16-inch thick.
- C. Grounding Plate: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section by 12 inches long, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

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

2.4 STATIC GROUNDING FOR AIRCRAFT PRODUCTION

- A. Use applicable Boeing standard installation details for an approved static grounding system. Ground reels or fixed cables shall be approved by Boeing Site Services Electrical Engineering.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install stranded conductors unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 30 inches below grade.
 - 2. Duct-Bank Grounding Conductor: Bury insulated conductor on top of all duct banks.
- C. Grounding Plate: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install plate on insulated spacers two inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 SERVICE ENTRANCE

- A. Provide a grounding electrode system at:
 - 1. Service entrance connection point to building's power system.
 - 2. Medium voltage service to first unit substation within a building's power system.
- B. For grounding electrode system, install at least three rods spaced at least two rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Grounding Electrode Conductor
 - 1. Size in accordance with NFPA 70.
 - 2. Connect to grounded conductor (neutral) of service.
 - 3. Bond the grounded conductor to the grounding conductor at the service entrance only.
- D. Separately Derived Systems
 - 1. Provide a bond between the separately derived system and the grounding electrode system for the building (may be the building steel system).
 - 2. Provide a separate bond between the grounded conductor (neutral) and the grounding conductor at the power service.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so four inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from two 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 according to written instructions by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install at least two ground rods and ground ring around the pad as indicated. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes in at least two locations. Install bare conductor not less than No. 2/0 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 24 inches from the foundation.

- E. Fence Grounding: Fences surrounding the substation or other electrical installation shall have gate posts connected to two ground pads. The gate shall be bonded to the gate post with a flexible strap. Other fence posts shall be connected to the ground ring at fifty foot intervals.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
 - 8. 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.
 - 9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. 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.
- D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables, if installed: 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.
- E. Provide a static grounding system for the airplanes and airplane production cells as indicated. Static grounding shall be approved by Boeing Site Services Electrical Engineering.
- F. Provide a static grounding system for paint handling rooms as indicated.
- G. Ground shields surrounding cables at each end and to junction boxes and enclosures along the cable run.

- H. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding plate.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- I. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor in a test well at closest point to electrical service grounding electrode. Use bolted connection.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
 - 1. Test Wells: Install at least one test well with all services bolted. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
 4. Provide adequate corrosion protection to all bolted electrical bonds.
- F. Metal Parts to be Bonded: Bond the following metal parts:
1. Chilled water supply and return piping.
 2. Hot water supply and return piping.
 3. Chilled water pumps.
 4. Compressed air piping and receivers.
 5. AHU enclosures.
 6. Metal doors and door frames.
 7. Door controllers.
 8. Ladders and stairs.
 9. Variable frequency drive cabinets.
 10. Cable tray systems, to each other and carried raceways.
 11. Fume hoods.
 12. Eye wash stations.
 13. HVAC VAV boxes.
 14. Sump pumps and controller cabinets.
 15. Crane rails, each section.
 16. Underground metallic fuel tank.
 17. Generator and metallic parts of fuel delivery system.
 18. Resistance load bank.
 19. Vacuum Piping Systems.
 20. Dust Collection Systems.
- G. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

- H. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- I. Grounding for Steel Building Structure: Install a driven ground rod at base of each column and at intermediate exterior columns at distances not more than 60 feet apart.
- J. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
 - 1. Install bare-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
 - 2. Bury ground ring not less than 30 inches deep and at least 24" outside the drip line of structures or from the building's foundation.
- K. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
 - 1. Bond grounding conductor to reinforcing steel. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.6 LABELING

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

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

- a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned Drawings locating each test well, ground rod and ground- rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 5. If necessary, add one 10 feet long section to the grounding electrodes, but do not make longer than 20 feet.
 6. Static ground system for airplane production shall be tested to grounded building steel. The impedance shall be less than 10 ohms from the aircraft static ground cabling to building steel.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
 6. Manhole Grounds: 10 ohms.
 7. Airplane Static Ground System: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following: Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 SUBMITTALS

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

1.6 QUALITY ASSURANCE

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

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.

- c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber- resin channels and angles with 9/16-inch diameter holes at a maximum of eight inches o.c., in at least one surface.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- 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. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

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

PART 3 - EXECUTION

3.1 APPLICATION

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

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200-lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 7. To Light Steel: Sheet metal screws.
 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

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

3.4 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 ten bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

1. 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. Apply paint by brush or spray to provide minimum dry film thickness of 2.0-mils.

2. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
3. 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 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following: Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work. Custom enclosures and cabinets.
 - 1. For handholes and boxes for underground wiring, including the following:

- a. Duct entry provisions, including locations and duct sizes.
 - b. Frame and cover design.
 - c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 - e. Joint details.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Structural members in the paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
- D. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Qualification Data: For professional engineer and testing agency.
- F. Source quality-control test reports.

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 NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alflec Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Manhattan/CDT/Cole-Flex.
 - 6. Maverick Tube Corporation.
 - 7. O-Z Gedney; a unit of General Signal.
 - 8. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
 - 3. Comply with UL6.
 - 4. Comply with ASTM D780, ASTM D1151 and ASTM D2247 verified by ETL list PVC-001.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel, compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Arnco Corporation.
 - 2. CANTEX Inc.
 - 3. CertainTeed Corp.; Pipe & Plastics Group.
 - 4. Condux International, Inc.
 - 5. Electri-Flex Co.
 - 6. Lamson & Sessions; Carlon Electrical Products.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. RACO; a Hubbell Company.
 - 9. Thomas & Betts Corporation.
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- D. LFNC: UL 1660.
- E. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: UL 514B.

2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Endot Industries Inc.
 - 2. IPEX Inc.
 - 3. Lamson & Sessions; Carlon Electrical Products.
 - 4. MaxCell Fabric Innerduct
- B. Description: Comply with UL 2024; flexible type, approved for general-use installation.
- C. Provide (3) MaxCell 3" 3-Cell packs, Part No. MXC3456XX series, total of 9 cells in each underground communications 4" conduit for fiber optic cabling. Provide pullstring only for spare conduits and conduits dedicated for copper OSP cabling.
- D. Provide (1) MaxCell 2" 3-Cell pack, Part No. MXC2003XX series, in each underground SCADA communications 2" conduit for fiber optic cabling. Provide pullstring only for spare conduits.

2.4 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, 12, and 3R, unless otherwise indicated.
- D. Fittings and Accessories: Include 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.
- E. Wireway Covers: Hinged type and flanged-and-gasketed type in wet areas.
- F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. RACO; a Hubbell Company.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Co.; Adalet Division.
 - 10. Spring City Electrical Manufacturing Company.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
- H. Cabinets:
 - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 - 1. Color of Frame and Cover: Gray, ANSI 61.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, as indicated for each service.
 - 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - 7. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.
 - d. NewBasis.
 - e. Old Castle
 - f. Quazite

2.7 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.8 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Advance Products & Systems, Inc.
 2. Calpico, Inc.
 3. Metraflex Co.
 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.9 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
1. Tests of materials shall be performed by a independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 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.
 3. Underground Conduit: Type EPC-40-PVC, direct buried.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.
 6. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
 - b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer-concrete units, SCTE 77, Tier 8 structural load rating.
 - c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf vertical loading.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.

- b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. All exposed conduits below 48" above finished floor.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: Rigid steel conduit.
 - 7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
 - 8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: EMT.
 - 9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: General-use, optical fiber/communications cable raceway.
 - 10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
- 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot- water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from Type EPC-40-PVC to PVC coated rigid steel conduit, or PVC coated IMC before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - 1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 - 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 - 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.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces or indoor to outdoor transitions.
 - 2. Where otherwise required by NFPA 70.
- N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.
 - 1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:

- a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- O. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- P. 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.
- Q. Set metal floor boxes level and flush with finished floor surface.
- R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF MINOR UNDERGROUND CONDUIT

- A. For major underground conduit installation, greater than 50 feet, comply with Division 26 Section "Underground Ducts and Raceways for Electrical Systems."
- B. Direct-Buried Conduit:
 1. Excavate trench bottom to provide firm and uniform support for conduit 6 inches below slab. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches 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 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. Install manufactured PVC coated rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor. All stub-ups shall have threaded coupling set flush with floor. Plug those not in use.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, placing them 24 inches o.c. Align planks along the width and along the centerline of conduit.
6. Warning Tape: Underground-line warning tape specified in Division 16 Section "Electrical Identification" for power and communications systems. 12" above direct buried conduits.

3.4 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 sieve to No. 4 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 above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

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

3.8 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 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 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Elastomeric sealants.

- B. Related Requirements:

1. Division 07 Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - 2. Pressure Plates: Carbon steel.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 ELASTOMERIC SEALANTS

- A. Provide per Division 07.
- B. Foams: Provide per Division 07.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high letters on 20-inch centers.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.
- F. Metal Tags: Brass or aluminum, 2 by 2 by 0.05-inch, with stamped legend, punched for use with self-locking cable tie fastener.
- G. Write-On Tags: Polyester tag, 0.015-inch thick with corrosion-resistant grommet and cable tie for attachment to conductor or cable. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

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

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05-inch, with stamped legend, punched for use with self-locking cable tie fastener.
- D. Write-On Tags: Polyester tag, 0.015-inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3-mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Write-On Tags: Polyester tag, 0.015-inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 UNDERGROUND-LINE WARNING TAPE

- A. Polyethyleneplastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded Yellow for Electrical lines and Orange for communication lines and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

2.6 FLOOR MARKING TAPE

- A. 2-inch wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.7 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches.
- D. Metal-Backed, Butyrate Warning Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.
 - 3. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES, 42 INCHES, 48 INCHES, OR 60 INCHES AS APPROPRIATE."

2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch thick for signs up to 20 sq. inches and 1/8--inch thick for larger sizes.
 1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8-inch.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8-inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.9 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Black letters on a white background. Minimum letter height shall be 3/8- inch.

2.10 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 1. Minimum Width: 3/16-inch.
 2. Tensile Strength at 73-deg F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185-deg F.
 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 1. Minimum Width: 3/16-inch.
 2. Tensile Strength at 73-deg F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185-deg F.
 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 1. Minimum Width: 3/16-inch.
 2. Tensile Strength at 73-deg F, According to ASTM D 638: 7000 psi.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284-deg F.
 5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- I. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.

3. UPS.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service conductors.
 - a. Color shall be a solid color insulation jacket for sizes #6 and smaller. Sizes #4 and larger may have colored tape at each end/splice if acceptable to Authority Having Jurisdiction.
 - b. Colors for 208Y/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral: White.
 - 5) Ground: Green.
 - c. Colors for 480Y/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral: Gray.
 - 5) Ground: Green.
 - d. Each neutral for computers, communications or other sensitive equipment and systems furniture circuits shall have colored tracer to match the associated phase conductor color.
 - e. Isolated ground wire or second ground wire serving computers, communications or other sensitive equipment or in systems furniture shall have a yellow tracer.
 - f. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags showing feeder ID as a minimum.
 1. Tape markers should be one black and one purple band for Phase A, one red and one purple band for Phase B, and one blue and one purple band for Phase C.
 2. All exposed conduit shall be painted orange and labeled "Over 600V".
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach tags to all conductors.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

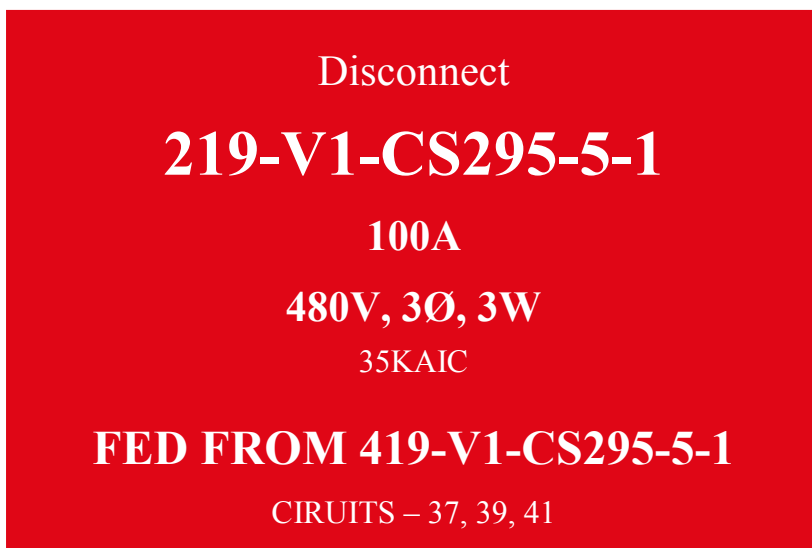
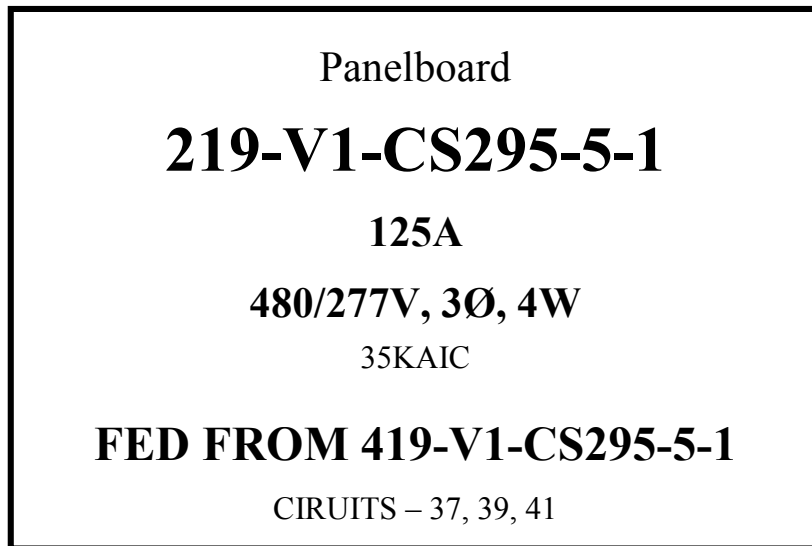
- G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer load shedding.
- K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Provide size and text as indicated on the contract drawing label details. 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: Engraved, laminated phenolic label. Provide label size, colors and height of letters as indicated on the contract drawings.
 - b. Outdoor Equipment: Stenciled legend four inches high. Engraved, laminated phenolic label. Provide label size, colors and height of letters as indicated on the contract drawings.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated phenolic label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchgear. Identification shall be engraved, laminated phenolic label.
 - e. Switchboards. Identification shall be engraved, laminated phenolic label.
 - f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary. Identification shall be engraved, laminated phenolic label.

- g. Substations. Identification shall be engraved, laminated phenolic label.
- h. Emergency system boxes and enclosures.
- i. Motor-control centers. Identification shall be engraved, laminated phenolic label.
- j. Enclosed switches. Identification shall be engraved, laminated phenolic label.
- k. Enclosed circuit breakers. Identification shall be engraved, laminated phenolic label.
- l. Enclosed controllers. Identification shall be engraved, laminated phenolic label.
- m. Variable-speed controllers. Identification shall be engraved, laminated phenolic label.
- n. Push-button stations.
- o. Power transfer equipment. Identification shall be engraved, laminated phenolic label.
- p. Contactors.
- q. Remote-controlled switches, dimmer modules, and control devices.
- r. Battery racks.
- s. Power-generating units.
- t. Monitoring and control equipment.
- u. UPS equipment.
- v. Receptacles.
- w. Fan controllers.
- x. SCADA equipment.
- y. UPS equipment and circuits. Identification shall be engraved, laminated phenolic label.
- z. PDU's. Identification shall be engraved, laminated phenolic label.

Nameplates format for Normal and Emergency/UPS power:

For Switch / Switchgear / Substations / Panels / Disconnects / etc.

Example for Normal power Panel Nameplate:



Example for Emergency/UPS power Panel Nameplate: For Panels/Disconnects/ATS /etc.

Example for Size / Format:

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"	Main Switchgear Shiny Diner 12000A 13.8kV, 3Ø, 3W 65kAIC Fed From SCEG Through 13.8kV Line A	Name / Size 16
		Panel / Size 24 Bold
		Amps / Size 16
		Volts / Size 18 Bold
		KAIC / Size 12
		Fed Panel / Size 18 Bold
		Cir. / Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"		<i>Name / Size 16</i>
		<i>Panel / Size 24</i> Bold
		<i>Amps / Size 16</i>
		<i>Volts / Size 18</i> Bold
		<i>KAIC / Size 12</i>
		<i>Fed Panel / Size 18</i> Bold
		<i>Cir. / Size 12</i>
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Switch</p> <p>'G2 – A'</p> <p>600A</p> <p>13.8kV</p> <p>Fed From Shiny Diner</p> <p>Cir. Breaker-Position B - 8</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 18 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Switch</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 18 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"	<p>Switchgear</p> <p>G2</p> <p>3200A</p> <p>480/277V, 3Ø, 4W</p> <p>65kAIC</p> <p>Fed From Switch 'G2-A' & 'G2-B'</p> <p>Through 13.8kV to 480/277V Transformer</p>	<i>Name / Size 16</i>
		<i>Panel / Size 24 Bold</i>
		<i>Amps / Size 16</i>
		<i>Volts / Size 18 Bold</i>
		<i>KAIC / Size 12</i>
		<i>Fed Panel / Size 18 Bold</i>
		<i>Cir. / Size 12</i>
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"		<i>Name / Size 16</i>
		<i>Panel / Size 24 Bold</i>
		<i>Amps / Size 16</i>
		<i>Volts / Size 18 Bold</i>
		<i>KAIC / Size 12</i>
		<i>Fed Panel / Size 18 Bold</i>
		<i>Cir. / Size 12</i>
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered		Size of writing
Height 3"	<p>Substation</p> <p>G2 – A</p> <p>3200A</p> <p>480/277V, 3Ø, 4W</p> <p>65kAIC</p> <p>Fed From Switch ‘G2-A’</p> <p>Through 13.8kV to 480/277V Transformer</p>		Name / Size 16
			Panel / Size 24 Bold
			Amps / Size 16
			Volts / Size 16 Bold
			KAIC / Size 12
			Fed Panel / Size 18 Bold
			Cir. / Size 12
	Width 4-1/4"		

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered		Size of writing
Height 3"	<p>Substation</p>		Name / Size 16
			Panel / Size 24 Bold
			Amps / Size 16
			Volts / Size 16 Bold
			KAIC / Size 12
			Fed Panel / Size 18 Bold
			Cir. / Size 12
	Width 4-1/4"		

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Switchboard</p> <p>219-V1-CS295-5-1</p> <p>125A</p> <p>480/277V, 3Ø, 4W</p> <p>35KAIC</p> <p>FED FROM 419-V1-CS295-5-1</p> <p>CIRCUITS – 37, 39, 41</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Switchboard</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"	Panelboard	Name / Size 16
	219-V1-CS295-5-1	Panel / Size 24 Bold
	125A	Amps / Size 16
	480/277V, 3Ø, 4W	Volts / Size 16 Bold
	35KAIC	KAIC / Size 12
	FED FROM 419-V1-CS295-5-1	Fed Panel / Size 18 Bold
	CIRUITS – 37, 39, 41	Cir. / Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered Emergency Power / Writing White on Red / Times New Roman / Cell Centered	Size of writing
Height 3"	Panelboard	Name / Size 16
		Panel / Size 24 Bold
		Amps / Size 16
		Volts / Size 16 Bold
		KAIC / Size 12
		Fed Panel / Size 18 Bold
		Cir. / Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Transformer</p> <p>NDI House Panel</p> <p>30kVA</p> <p>480V to 120V/208V, 3Ø, 4W</p> <p>35KAIC</p> <p>FED FROM 419-V1-CS295-5-1</p> <p>CIRCUITS – 37, 39, 41</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Transformer</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Disconnect</p> <p>219-V1-CS295-5-1</p> <p>100A</p> <p>480V, 3Ø, 3W</p> <p>35KAIC</p> <p>FED FROM 419-V1-CS295-5-1</p> <p>CIRCUITS – 37, 39, 41</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

	Normal Power / Writing Black on White / Times New Roman / Cell Centered	Size of writing
	Emergency Power / Writing White on Red / Times New Roman / Cell Centered	
Height 3"	<p>Disconnect</p>	<i>Name /</i> Size 16
		<i>Panel /</i> Size 24 Bold
		<i>Amps /</i> Size 16
		<i>Volts /</i> Size 16 Bold
		<i>KAIC /</i> Size 12
		<i>Fed Panel /</i> Size 18 Bold
		<i>Cir. /</i> Size 12
	Width 4-1/4"	

END OF SECTION 26 05 53

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes commissioning process requirements for Electrical, Lighting, Voice, Data, Security, and Fire Alarm systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.3 REFERENCES

- A. ANSI/NETA ATS (International Electrical Testing Association, Inc.) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. NFPA 70 (National Fire Protection Association) National Electrical Code.
- C. NFPA 70E (National Fire Protection Association) Standard for Electrical Safety in the Workplace.
- D. NFPA 110 (National Fire Protection Association) Standard for Emergency and Standby Power Systems.

1.4 DEFINITIONS

- A. Acceptable Performance: A component or system being able to meet specified design parameters under actual load.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CA: Commissioning Authority.
- D. ETO: Electrical Test Organization
- E. Field Commissioning Notebook: The General Contractor will maintain the commissioning documentation,

- F. Functional Performance Testing: Full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the Contract Documents. In this context "function" includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.
- G. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- H. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Collect and assemble the Subcontractor and/or supplier information required for development of a complete Commissioning Plan and Functional Performance Test for all systems to be commissioned by the Commissioning Authority for inclusion into the commissioning report. The Contractor and appropriate Subcontractors shall review these documents. Confirm in writing to the Owner, Architect, and Commissioning Authority any known areas of conflict or areas requiring clarification.
- B. Collect all proposed start-up and pre functional checklist documentation from appropriate Subcontractors, third party electrical testing agencies (ETO), and equipment vendors. Provide that information to the Commissioning Authority for inclusion into the commissioning report. Incorporate that information into the documentation System.
- C. Provide commissioning documentation electronically, managed by the Contractor. The Contractor shall confirm in writing to the Commissioning Authority that systems are complete, functional, and the appropriate Subcontractors have signed off all pre functional performance documentation
- D. Perform commissioning tests in coordination with the CA and the Commissioning plan.
- E. Participate in regular commissioning meetings with the Architect and Commissioning Authority. Coordinate directly with each Subcontractor on their specific responsibilities and contractual obligation
- F. Attend construction phase controls coordination meeting(s).
- G. Attend testing, adjusting, and balancing review and coordination meeting(s).
- H. Participate in fire alarm and lighting control systems commissioning by the CA. Provide third party ETO(s) for testing of the generators, electrical systems and assemblies, equipment, and component maintenance orientation and inspection in coordination with the CA.
- I. Provide information requested by the CA for final commissioning documentation.

- J. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
- K. Provide the following information to the CA for inclusion in the commissioning documentation:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's pre-start and startup checklists for systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, pre-start checks, and startup procedures have been completed.
 - 5. Certificate of readiness certifying that systems, subsystems, equipment, and associated controls are ready for testing.
 - 6. Test and inspection reports and certificates.
 - 7. Corrective action documents.
 - 8. Verification of testing, adjusting, and balancing reports.
- L. COMMISSIONING DOCUMENTATION
 - 1. Provide the following information to the CA for inclusion in the commissioning plan:
 - a. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - b. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - c. Process and schedule for completing construction checklists and manufacturer's pre-start and startup checklists for systems, assemblies, equipment, and components to be verified and tested.
 - d. Certificate of completion certifying that installation checks, and startup procedures have been completed.
 - e. Certificate of readiness certifying that systems, subsystems, equipment, and associated controls are ready for testing.
 - f. Test and inspection reports and certificates.
 - g. Corrective action documents.
 - h. Verification of testing, adjusting, and balancing reports.

1.6 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

- A. Provide Project-specific pre functional checklists and commissioning process functional performance test procedures for actual systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Develop the Commissioning Plan for the commissioning of the Lighting control systems.
- C. Develop commissioning pre functional checklist with appropriate documentation provided from Contractor for inclusion into the documentation system.
- D. Develop Functional Test Procedures from final control documentation including narrative sequences of operation, control diagrams, and software code for execution with the assistance of Contractor staff as required.
- E. Direct and perform functional performance tests with assistance from Subcontractors as required
- F. Witness and verify satisfactory completion of equipment and component tests and systems and inter- systems performance tests.
- G. Participate in the development of schedules with the Contractor for start-up and functional performance testing. This is to be coordinated with required building purge or Owner occupancy schedules required by the Owner.
- H. Review reports and witness and direct the testing verification effort.
- I. When commissioning has been successfully completed, recommend acceptance to the Owner.
- J. Once all functional performance tests have been successfully completed and all outstanding issues resolved, the Commissioning Authority will provide the Owner with a final report of all commissioning activities that occurred during the project.
- K. The Commissioning Authority will formally communicate with the Contractor via approved project channels. It is expected, however, that informal communication and coordination will be conducted directly with the Subcontractors. Records of all contacts will be sent to the Architect through the normal channels
- L. The Commissioning Authority is not authorized to modify, add to, or revoke the requirements of the Contract Document. A change in the Work can only be made as provided in the General Conditions

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

3.1 TESTING PREPARATION

A. The contractor shall

1. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
2. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
3. Certify that testing and adjusting procedures have been completed and that testing and adjusting, reports have been submitted, discrepancies corrected, and corrective work approved.
4. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
5. Inspect and verify the position of each device and interlock identified on checklists.
6. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
7. Testing Instrumentation: Install measuring instruments and logging devices to record test data in coordination with the CA.

3.2 TESTING VERIFICATION

A. Prior to performance of testing Work, provide copies of reports, sample forms, checklists, and certificates to the GC/CA for inclusion into the VELA system.

B. Provide technicians, instrumentation, and tools to verify testing of electrical systems in coordination with the CA.

1. The Subcontractor (ETO) will notify the CA 14 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes any construction or manufacturing defect that renders the electrical system or subsystem unable to provide its intended function. Failure shall result in rejection of the final testing report.
4. Remedy the deficiency and notify the CA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test in coordination with the CA.
- B. Scope of electrical commissioning tests shall include the functional testing of the entire electrical installation beginning at the utility interface and ending at the utilization equipment including, but not limited to:
 - 1. Generator and Transfer Switches.
 - 2. Switchgear.
 - 3. Switchboards.
 - 4. Transformers.
 - 5. Conductors.
 - 6. Panelboards.
 - 7. Protective relays.
 - 8. Control relays.
 - 9. Programmable logic controllers.
 - 10. Human machine interfaces.
 - 11. Circuit breakers.
 - 12. Bussing.
 - 13. Substations.
- C. Scope of lighting system testing shall include the entire lighting system of automatic and manual controls including, but not limited to:
 - 1. Occupancy sensors.
 - 2. Timed lighting controls.
 - 3. Day-lighting controls.
 - 4. Dimmers.
 - 5. Scene controls.
 - 6. Exterior light sensors.
 - 7. Obstructions and light pollution controls.
 - 8. Lighting system control interlocks, meters, and contacts.
 - 9. Human Machine Interface.
 - 10. External Control System Interface (BAS, EMCS, SCADA).
- D. Testing of fire alarm systems shall include the entire fire alarm system from each initiating device through the fire alarm control and annunciation panels to the master fire alarm station including, but not limited to:
 - 1. Smoke detectors.

2. Duct smoke detectors.
 3. Heat detectors.
 4. Manual initiating devices including pull stations.
 5. Notification strobes.
 6. Notification horns and alarms.
 7. System failure alarms and notifications.
 8. Spare circuits in control panel.
 9. Battery.
 10. Charger.
 11. Wiring.
 12. Human Machine Interface for Fire Alarm System
 13. Central Dispatch Interface and Notification
- E. Testing of voice and data systems shall include the entire system from the site master operating station to each utilization device including, but not limited to:
1. Data outlets.
 2. Voice outlets.
 3. Patch panels.
 4. Cross connects.
 5. Uninterruptible Power Supplies.
 6. Wiring.
- F. Testing of security systems shall include the entire system from the on/off-site security monitoring station to each detection and monitoring device including, but not limited to:
1. Cameras.
 2. Keyed and keypad entry locks.
 3. Tamper detectors.
 4. Intrusion detectors.
 5. Motion sensors.
 6. Monitors.
 7. System failure monitors and notification.
 8. Uninterruptible Power Supplies.
 9. Wiring.
- G. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

- H. The CA along with the Contractor, Electrical Subcontractor, Lighting Subcontractor, Voice and Data Subcontractor, Security Subcontractor, and Fire Alarm Subcontractor, shall prepare detailed testing plans, procedures, and checklists for electrical; lighting; voice and data; security; and fire alarm systems, subsystems, and equipment.
- I. Tests will be performed using design conditions whenever possible.
- J. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- K. The CA may direct that set points be altered when simulating conditions is not practical.
- L. The CA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- M. If tests cannot be completed because of a deficiency outside the scope of the system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- N. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 ELECTRICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Electrical Generation, Transmission, Distribution, and Utilization System Testing: Field testing plans and testing requirements in accordance with ANSI/NETA ATS and as specified in Divisions 26 and 33.
- B. Lighting and Lighting Control System Testing: Field testing plans and testing requirements are specified in Division 26. Assist the CA with preparation of testing plans.
- C. Fire Alarm System Testing: Field testing plans and testing requirements are specified in Divisions 26 and 28. Assist the CA with preparation of testing plans.
- D. Security System Testing: Field testing plans and testing requirements are specified in Divisions 26 and 28. Provide to the CA testing plans.
- E. Voice and Data Systems Testing: Field testing plans and testing requirements are specified in Divisions 26 and 27. Provide to the CA testing plans.

3.5 COMMISSIONING COMPLETION

- A. Upon Contractor's completion of the requirements of the commissioning plan and the successful completion of the Performance period, and receipt of the required documentation, the Architect will provide the Owner with a statement of acceptable

performance. Receipt of the acceptable performance statement by the Owner shall be a condition of final completion of the project.

END OF SECTION 26 08 00

SECTION 26 32 13 - ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes packaged engine-generator sets for emergency and standby power supply with the following features:
 - 1. Diesel engine.
 - 2. Unit-mounted and Remote-mounting cooling systems as indicated.
 - 3. Unit-mounted control and monitoring.
 - 4. Performance requirements for sensitive loads.
 - 5. Load banks.
- B. Related Sections include the following:
 - 1. Division 26 Section "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine- generator sets.
 - 2. Boeing Electrical Standards "Emergency and Standby Diesel Generator Systems" Section D38201-8.

1.3 DEFINITIONS

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
 - 1. Thermal damage curve for generator.
 - 2. Time-current characteristic curves for generator protective device.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
 - 2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
 - 4. Wiring Diagrams: Power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that day.
- D. Tank, engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems". Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

PART 2 - The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Source quality-control test reports.

Certified summary of prototype-unit test report.

 - 1. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
 - 2. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
 - 3. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
 - 4. Report of sound generation.
 - 5. Report of exhaust emissions showing compliance with applicable regulations.
 - 6. Certified Torsional Vibration Compatibility: Comply with NFPA 110.
- C. Field quality-control test reports.

- D. Operation and Maintenance Data: For packaged engine generators 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. 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.
- E. Warranty: Special warranty specified in this Section.

2.2 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 - 1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
 - 2. 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. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with ASME B15.1.
- F. Comply with NFPA 37.
- G. Comply with NFPA 70.
- H. Comply with NFPA 99.
- I. Comply with NFPA 110 requirements for Level 1 emergency power supply system.
- J. Comply with UL 2200.
- K. Engine Exhaust Emissions: Comply with applicable EPA, state and local government requirements.
- L. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator

set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

2.3 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Construction Manager's written permission.
- B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: Minus 15 to plus 40 deg C.
 - 2. Relative Humidity: 0 to 95 percent.
 - 3. Altitude: Sea level to 3000 feet.
- C. Unusual Service Conditions: Engine-generator equipment and installation are required to operate under the following conditions:
 - 1. High salt-dust content in the air due to sea-spray evaporation.

2.4 COORDINATION

- A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

2.5 WARRANTY

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

2.6 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and

adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

2.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
 - 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 - 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

PART 3 - PRODUCTS

3.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Caterpillar; Engine Div.
 - 2. Kohler Co.; Generator Division.
 - 3. Onan/Cummins Power Generation; Industrial Business Group.

3.2 ENGINE-GENERATOR SET

- A. Factory-assembled and -tested, engine-generator set.
- B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.
- C. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated.
 - 2. Output Connections: Three-phase, four wire.
 - 3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- D. Generator-Set Performance:
 - 1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.

2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: Comply with NFPA 110, Type 10, system requirements.

3.3 ENGINE

- A. Fuel: Fuel oil, Grade DF-2.
- B. Rated Engine Speed: 1800 rpm.
- C. Engine Type: Four cycle only
- D. Maximum Piston Speed for Engines: 2250 fpm.
- E. Lubrication System: The following items are mounted on engine or skid:
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- F. Engine Fuel System:
 1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
 2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

- G. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.
- H. Governor: Digital electronic , adjustable isochronous, with speed sensing.
- I. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
 - 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 - 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 - 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 - 4. Fan: Engine driven.
 - 5. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 - 6. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

PART 4 - Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.

PART 5 - End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

- A. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1. Minimum sound attenuation of 25 dB at 500 Hz.
 - 2. Sound level measured at a distance of 10 feet from exhaust discharge after installation is complete shall be 85 dBA or less.
- B. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- C. Starting System: 24-V electric, with negative ground.
 - 1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
 - 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 - 3. Cranking Cycle: As required by NFPA 110 for system level specified.

4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least three times without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

PART 6 - Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.

PART 7 - Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.

PART 8 - Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.

PART 9 - Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.

PART 10 - Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

PART 11 - Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

11.1 FUEL OIL STORAGE

- A. Comply with NFPA 30.
- B. Day Tank: Comply with UL 142, freestanding, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:

1. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of day tank.

PART 12 - Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.

1. Tank Capacity: As recommended by engine manufacturer for an uninterrupted period of 2 hours' operation at 100 percent of rated power output of engine- generator system without being refilled.
2. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
3. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.
4. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.
5. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.
6. Redundant High-Level Fuel Shutoff: Actuated by high-level alarm sensor in day tank to operate a separate motor device that disconnects day-tank pump motor. Sensor shall signal solenoid valve, located in fuel suction line between fuel storage tank and day tank, to close. Both actions shall remain in shutoff state until manually reset. Shutoff action shall initiate an alarm signal to control panel but shall not shut down engine-generator set.
7. Electronic controls for pump.
8. Basis of Design : Tramont or approved equal

- B. Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:

1. Tank level indicator.
2. NFPA 110 required level switches
3. Capacity: Fuel for 12hours' continuous operation at 100 percent rated power output minimum.
4. Vandal-resistant fill cap.
5. Containment Provisions: Comply with requirements of authorities having jurisdiction.
6. Fill inlet containment 5 gallon min or more as required Local and State Regulations
7. Concrete encased steel tank Convault or Approved equal.

12.2 CONTROL AND MONITORING

1. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of

generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.
- C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.
- D. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:
 - 1. AC voltmeter.
 - 2. AC ammeter.
 - 3. AC frequency meter.
 - 4. DC voltmeter (alternator battery charging).
 - 5. Engine-coolant temperature gage.
 - 6. Engine lubricating-oil pressure gage.
 - 7. Running-time meter.
 - 8. Ammeter-voltmeter, phase-selector switch(es).
 - 9. Generator-voltage adjusting rheostat.
 - 10. Fuel tank derangement alarm.
 - 11. Fuel tank high-level shutdown of fuel supply alarm.
 - 12. Generator overload.
 - 13. Start-stop switch.
 - 14. Overspeed shutdown device.
 - 15. Coolant high-temperature shutdown device.
 - 16. Coolant low-level shutdown device.
 - 17. Oil low-pressure shutdown device.
- E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

- F. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Data system connections to terminals are covered in Division 26 Section "Electrical Supervisory Control and Data Acquisition (SCADA) System."
- G. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation, NEMA 4 where located on the exterior.

12.3 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
 - 1. Tripping Characteristic: Designed specifically for generator protection.
 - 2. Trip Rating: Matched to generator rating.
 - 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Generator Circuit Breaker: Molded-case, electronic-trip type; 100 percent rated; complying with UL 489. .
 - 1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - 2. Trip Settings: Selected to coordinate with generator thermal damage curve.
 - 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- C. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:
 - 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 - 2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 - 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.

- 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
- D. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

12.4 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Enclosure: Drip-proof.
- G. Instrument Transformers: Mounted within generator enclosure.
- H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
 - 1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
- I. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- K. Subtransient Reactance: 12 percent, maximum.

12.5 LOAD BANK

- A. Description: Permanent, indoor, remote-controlled, radiator fan cooled, resistive unit capable of providing a balanced 3-phase, delta-connected load to generator set at 50 percent rated-system capacity, at 80 percent power factor, lagging. Unit shall be capable of selective control of load in 25 percent steps and with minimum step changes of approximately 5 and 10 percent available.
- B. Basis of Design: Avtron or approved equal

- C. Resistive Load Elements: Corrosion-resistant chromium alloy with ceramic and steel supports. Elements shall be double insulated and designed for repetitive on-off cycling. Elements shall be mounted in removable aluminized-steel heater cases.
- D. Load Element Switching: Remote-controlled contactors switch groups of load elements. Contactor coils are rated 120 V. Contactors shall be located in a separate enclosure within load-bank enclosure, accessible from exterior through hinged doors with tumbler locks.
- E. Contactor Enclosures: Heated by thermostatically controlled strip heaters to prevent condensation.
- F. Load-Bank Enclosures: Type 1, complying with NEMA ICS 6. Protective Devices: Power input circuits to load banks shall be fused, and fuses shall be selected to coordinate with generator circuit breaker. Fuse blocks shall be located in contactor enclosure. Cooling airflow and overtemperature sensors shall automatically shut down and lock out load bank until manually reset. Safety interlocks on access panels and doors shall disconnect load power, control, and heater circuits. Fan motor shall be separately protected by overload and short-circuit devices. Short-circuit devices shall be noninterchangeable fuses with 200,000-A interrupting capacity.
- G. Remote-Control Panel: Separate from load bank in NEMA 250, Type 1 enclosure with a control power switch and pilot light, and switches controlling groups of load elements.
- H. Control Sequence: Control panel may be preset for adjustable single-step loading of generator during automatic exercising.

12.6 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized- steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material:] Bridge-bearing neoprene, complying with AASHTO M 251.
 - 2. Durometer Rating: 70.
 - 3. Number of Layers: Four.
- B. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4- inch- thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - 2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of 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.

12.7 FINISHES

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

12.8 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.

 1. Full load run.
 2. Maximum power.
 3. Voltage regulation.
 4. Transient and steady-state governing.
 5. Single-step load pickup.
 6. Safety shutdown.
 7. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 8. Report factory test results within 10 days of completion of test.

PART 13 - EXECUTION

13.1 EXAMINATION

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

13.2 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 restrained spring isolators having a minimum deflection of 1 inch on 4-inch- high concrete base. Secure sets to anchor bolts installed in concrete bases. Concrete base construction is specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- D. Install remote radiator with restrained spring isolators having a minimum deflection of 1 inch on equipment supports and interior location indicated.
- E. Install Schedule 40, black steel piping with welded joints for cooling water piping between engine-generator set and remote radiator. Piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping."
- F. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are 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. Flexible connectors and piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping."
- G. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

13.3 CONNECTIONS

- A. Piping installation requirements are specified in Division 23 Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- C. Connect cooling-system water piping to engine-generator set and remote radiator with flexible connectors.
- D. Connect engine exhaust pipe to engine with flexible connector.
- E. Connect fuel piping to engines with a gate valve and union and flexible connector.

1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems are specified in Division 23 Section "Facility Fuel-Oil Piping."
- F. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- G. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

13.4 IDENTIFICATION

- A. Identify system components according to Division 23 Section "Identification for HVAC Piping and Equipment" and Division 26 Section "Identification for Electrical Systems."

13.5 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. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection (except those indicated to be optional) 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.
 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

PART 14 - 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.

PART 15 - Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.

PART 16 - Verify acceptance of charge for each element of the battery after discharge.

PART 17 - Verify that measurements are within manufacturer's specifications.

1. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 2. 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.
 3. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 4. Exhaust Emissions Test: Comply with applicable government test criteria.
 5. 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.
 6. 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, and compare measured levels with required values.
- B. Coordinate tests with tests for transfer switches and run them concurrently.
- C. 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.
- D. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- E. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- F. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- G. Remove and replace malfunctioning units and retest as specified above.
- 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.
- 17.2 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 26 32 13

SECTION 26 41 13 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes lightning protection for structures and building site components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For air terminals and mounting accessories.
 - 1. Layout of the lightning protection system, along with details of the components to be used in the installation.
 - 2. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and manufacturer. Include data on listing or certification by UL to provide a Master Label for the systems.
- B. Certification, signed by Contractor, that roof adhesive is approved by manufacturer of roofing material.
- C. Field quality-control reports.
- D. Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system.
- E. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features, including the following:
 - 1. Ground rods.
 - 2. Ground loop conductor.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by UL or LPI as a Master Installer/Designer, trained and approved for installation of units required for this Project.
- B. System Certificate:
 - 1. UL Master Label.
 - 2. LPI System Certificate.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

1.6 COORDINATION

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
- B. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer and provide written confirmation.
- C. Flashings of through-roof assemblies shall comply with roofing manufacturers' specifications. Coordinate and provide written confirmation.
- D. Coordinate with design drawings and specifications to certify that installation of the system based on these would qualify for a UL Master Label. Prepare written report of discrepancies for Construction Manager prior to commencing installation.

PART 2 - PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. Comply with UL 96 and NFPA 780.
- B. Roof-Mounted Air Terminals: NFPA 780, Class II, aluminum unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Harger
 - b. East Coast Lightning Equipment Inc.
 - c. ERICO International Corporation.
 - d. Heary Bros. Lightning Protection Co. Inc.
 - e. Robbins Lightning, Inc.
 - f. Thompson Lightning Protection, Inc.
 - 2. Air Terminals More than 24 Inches Long: With brace attached to the terminal at not less than half the height of the terminal.

- 3. Single-Membrane, Roof-Mounted Air Terminals: Designed specifically for single-membrane roof system materials. Comply with requirements in Division 07 roofing Sections.
- C. Main and Bonding Conductors: Aluminum for roof and copper for in the ground and interior. Transition to copper 5' above ground.
- D. Ground Loop Conductor: The same size and type as the main conductor except tinned.
- E. Ground Rods: Copper-clad steel, sectional type; 3/4 inch in diameter by 10 feet long.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lightning protection components and systems according to UL 96A and NFPA 780.
- B. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends. Transition to copper 5' above ground using bimetallic connection.
- C. Conceal the following conductors:
 - 1. System conductors.
 - 2. Down conductors.
 - 3. Interior conductors.
 - 4. Conductors within normal view of exterior locations at grade within 200 feet of building.
- D. Cable Connections: Use exothermic-welded connections for all conductor splices and connections between conductors and other components.
 - 1. Exception: In single-ply membrane roofing, exothermic-welded connections may be used only below the roof level.
- E. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.
- F. Bond extremities of roof mounted metal bodies to lightning protection components at opposite corners at a minimum.
- G. Ground Loop: Install ground-level, potential equalization conductor and extend around the perimeter of structure based on the requirements of Division 26 Section "Grounding and Bonding for Electrical Systems".
 - 1. Bury ground ring not less than 24 inches from building foundation.
 - 2. Bond ground terminals to the ground loop.
 - 3. Bond grounded building systems to the ground loop conductor.

- H. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot intervals.

3.2 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.3 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
- B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

3.4 FIELD QUALITY CONTROL

- A. Notify Construction Manager at least 3 days in advance of inspection before concealing lightning protection components.
- B. UL Inspection: Meet requirements to obtain a UL Master Label for system.
- C. UL Master Label: Upon completion and review by Underwriters' Laboratories, obtain and deliver to Construction Manager a UL Master Label for the system.
- D. System Testing: Perform the following tests and prepare test reports:
 - Grounding System Resistance Test: 10 ohms.
 - Continuity Test for Integrally Mounted Lightning Protection Systems: 3 ohms.
 - Test resistance between all facilities on the site.
 - 1. Report measured values that exceed requirements.

END OF SECTION 26 41 13