



KINGFISHER COUNTY COMMISSIONERS

Jeff Moss, District 1
Ray Alan Shimanek, District 2
Heath Dobrovolsky, District 3

Phone: (405) 375-3808
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Kingfisher County Courthouse
101 S. Main, Room #9
Kingfisher, OK 73750

September 30, 2024

Bid # 5-24-25

NOTICE TO BIDDERS

Notice is hereby given that the Board of County Commissioners of Kingfisher County will receive sealed bids for labor and materials needed to complete the Kingfisher County Courthouse Electrical Upgrade. Bids will be accepted at the Kingfisher County Courthouse in the Office of the County Clerk until 4:00pm on the 1st day of November, 2024 to be opened at their regular meeting of November 4th, 2024.

Statement of Work and Specifications, plans and manual of the project to be bid are **located online at Kingfisher.okcounties.org under the bids tab.** The Pre-Bid meeting will be at 10:00 ~~Am~~ on Tuesday, October 15th, 2024 at the project site/ Kingfisher County Courthouse in the Court Conference Room @ 101 S. Main St Rd, Kingfisher, OK 73750.

The successful bidder is required to produce a performance bond upon request and to show certificates of Insurance, its limits, and Workers Compensation Insurance. This will be detailed in the Statement of Work and general requirements.

The Board of County Commissioners reserves the right to reject any or all bids. All bidders must complete a statement of non-collusion and a Cashier's Check, a certified check, or a surety bid bond in the amount of five percent (5%) of the gross amount of base bid as a guaranty, shall accompany the sealed proposal of each bidder. Deposits will be returned to the unsuccessful bidders and successful bidders, upon approval of the contract and submission of a 100% Performance Bond, a 100% Statutory Bond, and a 100% Maintenance Bond. Please contact Kingfisher County Clerk's office for bid results at 405-375-3887.

Board of County Commissioners
Kingfisher County Courthouse
Kingfisher, Oklahoma

CHAIRMAN: _____

Jeff Moss
Jeff Moss

MEMBER: _____

Ray Shimanek
Ray Shimanek

MEMBER: _____

Heath Dobrovolsky

ATTEST:



Jeannie Bauer
COUNTY CLERK

PROJECT MANUAL

Kingfisher County

Kingfisher County Courthouse Electrical Upgrade

PROJECT NO. 230855-002

PREPARED BY

PROFESSIONAL ENGINEERING CONSULTANTS, PA
1924 S. Utica Ave. Suite 1400
Tulsa OK 74104
918-664-5400 | www.pec1.com

SEPTEMBER 2024


SPECIFICATION SEALS PAGE

This section includes the Professional Seals by Design Professionals and others responsible for preparing the Construction Documents for Architect's project number 230855-002.

It shall be noted that for this project, the term "Architect" shall equal "Engineer" throughout the project manual and project plans.

1.1 DESIGN PROFESSIONALS OF RECORD

ELECTRICAL ENGINEER	
NAME:	Bryce A. Harris
34859	
(PROFESSIONAL NUMBER)	



END OF SECTION

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It shall be noted that for this project, the term “Architect” shall equal “Engineer” throughout the project manual and project plans.

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SECTION 00 11 13
ADVERTISEMENT FOR BIDS

Sealed bids addressed to the Owner will be received at the Place of Bid until the Time of Bid on the Bid Date and then will be opened and read publicly later.

PROJECT: Kingfisher County Courthouse Electrical Upgrade
OWNER: Kingfisher County Commissioners
101 South Main Street #9.
Kingfisher, OK 73750

BID DATE: November 1, 2024

TIME OF BID: 4:00 PM

PLACE OF BID: Kingfisher County Courthouse
Conference Room 101 S. Main Street
Kingfisher, OK 73750

Bids will be opened and read publicly at 9:00 AM on November 4, 2024, at Commissioner Meeting. Bids received more than ninety-six (96) hours, excluding Saturdays, Sundays, and holidays, before the time of bid, as well as any bids received after that time, will be returned unopened. Any bids received after the stated Time of Bid will be returned to the Bidder unopened.

Sealed bids addressed to the Kingfisher County Commissioners are requested to perform the Project Work.

The Owner will construct under the general contractor method and will be accepting a single bid for all Work required.

A copy of the Project Document is on file at the office of the Commissioners and is open for public inspection. Interested parties shall arrange an appointment to review the documents and must visit the site or attend the pre-bid meeting. Please do not visit the site without making prior arrangements.

Each Bidder shall submit their Proposal in a sealed envelope. Enclosed with their Proposal shall be executed copies of the Non-Collusion and Business Relationship Affidavits. Any bid not in compliance with the Project Documents will be rejected.

Each Bidder shall submit, with the Proposal, a Bidder's Bond as required in Laws of Oklahoma and the Project Documents. Such Bonds may be in the form of an irrevocable letter of credit, cashier's check or bid bond. Cash is not acceptable. All such bonds shall be made payable to the Owner in an amount no less than five (5%) percent of the largest combination of the Base Proposal and any Alternates. The Contractor may be required to forfeit the Bid Bond, to the Owner, in the event the Contractor fails to execute a Contract or fails to provide the required Bonding and Insurances.

Upon the Owner's acceptance of bids, a Contract will be executed between the Owner and the approved Bidder. All bonding and insurance will be attached to the executed Contract.

Bids may not be withdrawn for a period of thirty (30) calendar days after the date of this Bid Opening. The Owner reserves the right to reject any or all Bids and waive any informality or irregularity in any Bids received.

For information concerning any part of the proposed work, contact the Project Manager: Joe Mandrino, Professional Engineer Consultants (PEC), 1924 S Utica Ave Ste 1400 Tulsa, OK 74104. Telephone: (918) 664-5400. Email address: joseph.mandrino@pec1.com.

BY: Kingfisher County Commissioners
101 S. Main Street #9
Kingfisher, OK 73750

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SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

- 1.1 SEE AIA A701, INSTRUCTIONS TO BIDDERS FOLLOWING THIS DOCUMENT.
- 1.2 THE INSTRUCTIONS IN THIS DOCUMENT AMEND OR SUPPLEMENT THE INSTRUCTIONS TO BIDDERS AND OTHER PROVISIONS OF THE BIDDING AND CONTRACT DOCUMENTS.
- 1.3 DOCUMENT INCLUDES
 - A. Invitation
 - 1. Bid Submission
 - 2. Intent
 - 3. Work Identified in the Contract Documents
 - 4. Contract Time
 - B. Bid Documents and Contract Documents
 - 1. Definitions
 - 2. Contract Documents Identification
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 - 5. Inquiries/Addenda
 - 6. Product/Assembly/System Substitutions
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 - F. Bid Enclosures/Requirements
 - 1. Security Deposit
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5. Bid Form Requirements
6. Fees for Changes in the Work
7. Bid Form Signature
8. Additional Bid Information
9. Selection and Award of Alternates

G. Offer Acceptance/Rejection

1. Duration of Offer
2. Acceptance of Offer

1.4 RELATED DOCUMENTS

- A. Document 00 1113 - Advertisement for Bids.
- B. Document 00 4100 - Bid Form.
- C. Document 00 7200 - General Conditions.
- D. Document 00 7300 - Supplementary Conditions.
- E. Document 01 1100 - Summary of Work.

PART 2 - INVITATION

2.1 BID SUBMISSION

- A. Bids signed and under seal, executed, and dated will be received at the office of the Owner at address below before 4:00 PM. local daylight time on November 1, 2024.
 1. Kingfisher County Clerk's Office 101 S. Main Street
Kingfisher, Oklahoma 73750
- B. Offers submitted after the above time shall be returned to the bidder unopened.
- C. Offers will be opened publicly in Commissioner's meeting after the time for receipt of bids.
- D. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.

2.2 INTENT

- A. The intent of this Bid request is to obtain an offer for the installation of a facility generator located at the Kingfisher County Courthouse, in accordance with the Contract Documents.

2.3 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Work of this proposed Contract comprises new Project, and demolition, and other work as required to complete project, including general Project.

2.4 CONTRACT TIME

- A. Owner requires that under the work of this contract be completed as quickly as possible and consideration will be given to time of completion when reviewing the submitted bids.

PART 3 - BID DOCUMENTS AND CONTRACT DOCUMENTS

3.1 DEFINITIONS

- A. Bid Documents: Contract Documents supplemented with Invitation To Bid, Instructions to Bidders, Information Available to Bidders, Bid Form Supplements To Bid Forms and Appendices identified.
- B. Contract Documents: Defined in General Conditions to the Contract, including issued Addenda.
- C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
- D. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.
- E. Bid Form: A form which includes a specific space in which the bid price shall be inserted and which the Bidder shall sign and submit along with all other necessary submissions. A Bidder may submit a reasonable facsimile of the Bid Form. Bids received by facsimile or in electronic format will not be accepted.
- F. Bidding Requirements: Notice of Invitation to Bid, Prebid Information, Instructions to Bidders, Information Available for Bidders, the Bid Form, Supplements to the Bid Form, and portions of Addenda relating to any of these.
- G. Responsible Bidder: A Bidder who is properly licensed in accordance with the Project Industries Licensing Act and submits a Responsive Bid and who has furnished, when required, information and data to prove that his financial resources, production or service facilities, personnel, service reputation, and experience are adequate to make satisfactory delivery of the services, Project, or items of tangible personal property described in the Invitation for Bid.
- H. Responsive Bid: A bid which conforms in all material respects to the requirements set forth in the Invitation for Bid.
- I. Successful Bidder: The lowest Responsible Bidder to whom the Owner, on the basis of the Owner's evaluation, makes an award. A Successful Bidder does not become the contractor until an agreement with the Owner is signed.

3.2 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as Project Number 230855-002 as prepared by Architect, and with contents as identified in the Table of Contents.

3.3 AVAILABILITY

- A. Bid Documents may be obtained at the office of Architect.

- B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

3.4 EXAMINATION

- A. Bid Documents may be viewed at the office of Architect.
- B. Bid Documents may be viewed at the Kingfisher County Engineer's office, or the <https://kingfisher.okcounties.org/bids> website.
- C. Bid Documents are on display at the offices of the following Project plan rooms:
 - 1. ISQFT
 - 2. E-Plan
 - 3. Drexel Technologies
- D. It is the intent of these Bidding Documents to be as clear, complete and consistent as possible.
- E. Bidders are required to carefully review the:
 - 1. Bidding Documents (drawings and specifications).
 - 2. Bid Form.
 - 3. Contract for Project
- F. Upon receipt of Bid Documents verify that Architect should the documents be incomplete.
- G. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.
- H. The Bidder shall not take advantage of any error in the Bidding Documents. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown on or mentioned in both. In case of any apparent difference between the drawings and specifications, or any other apparent discrepancy which the Bidder may discover, the matter shall be referred to the Architect as to which, in accordance with the intent of the Bidding Documents, shall govern. The Owner and the Architect shall have the right to correct any error discovered.

3.5 INQUIRIES/ADDENDA

- A. Direct questions to the Architect, email: joseph.mandrino@pec1.com.
- B. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.
- C. Verbal answers are not binding on any party.
- D. Clarifications requested by bidders must be in writing not less than 4 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

3.6 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 5 days before receipt of bids.
- B. When a request to substitute a product is made, Architect may approve the substitution and will issue an Addendum to known bidders.
- C. The submission shall provide sufficient information to determine acceptability of such products.
- D. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- E. Provide products as specified unless substitutions are submitted in this manner and accepted.
- F. See Section 01 25 00 - Substitutions Procedures for additional requirements.
- G. See Section 01 60 00 - Product Requirements for additional requirements.

PART 4 - SITE ASSESSMENT

4.1 SITE EXAMINATION

- A. Examine the project site before submitting a bid.
- B. On request, the Owner will provide each Bidder access to the site to conduct investigations and tests a Bidder deems necessary for submission of his Bid.
- C. Bidders shall promptly notify Architect of any ambiguity, inconsistency, or error which they may discover upon examination of the site and local conditions.
- D. The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this Section and that the Bidding Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

4.2 PREBID CONFERENCE

- A. Architect along with representative of Owner will conduct a Prebid Conference for this project at Kingfisher County Courthouse 101 S. Main Street, Conference Room 101, Kingfisher, OK., refer to 00 25 13 Pre-Bid Meeting.
- B. Architect and his consultants, as applicable, shall be represented. Prospective Bidders, Prospective Subcontractors, and Prospective Vendors are encouraged to attend and should be prepared to ask questions regarding substitutions and to request clarification of the Bidding Documents. The failure of a Bidder, Subcontractor, or Vendor to attend shall be interpreted to mean that the Bidding Documents are clear and acceptable to all non-participants at the Prebid Conference. Such clarity and acceptability shall be presumed with respect to all Bidders.

- C. Questions and requests for clarification presented in written form will receive written response, and if warranted, issued as Addenda. No verbal response shall be binding.

PART 5 - QUALIFICATIONS

5.1 EVIDENCE OF QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, license to perform work in the State.

5.2 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
- B. Refer to General Conditions and Supplementary Conditions.

PART 6 - BID SUBMISSION

6.1 BID DEPOSITORY

- A. The five percent (5%) Bid Depository system of bid collection shall be used for all trades.
- B. The rules and regulations of this bid deposit system, in force on the day of bid submission shall apply.

6.2 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
 - 1. No other party, Owner, or Architect, etc. is responsible for making sure the submitted Bid is delivered to the location where the Bid will be opened and read aloud, no exception.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed, and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside.
- C. Incomplete bid submission may be the cause to reject the Bid Form and declare the bid invalid or informal.
- D. An abstract summary of submitted bids will be made available to all bidders following bid opening.

6.3 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

- B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Owner, be declared unacceptable.
- C. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Owner, invalidate the bid.
- D. Failure to provide the business relationship and noncollusion affidavits will invalidate the bid.

6.4 SECURITY DEPOSIT

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form. Certified check and irrevocable letter of credit, as allowed by the Competitive Bidding Act, will be allowed.
- B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.
- C. The security deposit will be returned after delivery to the Owner of the required Defect, Performance and Payment Bond(s) by the accepted bidder.
- D. Include the cost of bid security in the Bid Amount.
- E. After a bid has been accepted, all securities will be returned to the respective bidders and other requested enclosures.
- F. If no contract is awarded, all security deposits will be returned.

6.5 PERFORMANCE ASSURANCE

- A. Accepted Bidder: Provide a Performance bond as described in 00 73 00 - Supplementary Conditions.
- B. Include the cost of Performance and Payment Bonds and Defect Bond in the Bid Amount.

6.6 INSURANCE

- A. Provide an executed "Undertaking of Insurance" on a standard form provided by the insurance company stating their intention to provide insurance to the bidder in accordance with the insurance requirements of the Contract Documents.

6.7 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.
- B. Taxes: Refer to Document 00 73 00 - Supplementary Conditions for products that are tax exempt.
 - 1. This project is wholly exempt.

6.8 FEES FOR CHANGES IN THE WORK

- A. Include in the Bid Form, the overhead and profit fees on own Work and Work by subcontractors, applicable for Changes in the Work, whether additions to or deductions from the Work on which the Bid Amount is based.

6.9 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:
 - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
 - 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
 - 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
 - 4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

6.10 ADDITIONAL BID INFORMATION

- A. The lowest bidder will be requested to complete the Supplements To Bid Forms within 48 hours after open of bids.
- B. Submit the following Supplements 48 hours after bid submission:
 - 1. Proposed Schedule of Values Form identifies the Bid Amount segmented into portions as requested.
 - a. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.
 - 1) Provide completed General Conditions and Fee Matrix.
 - b. Arrange schedule of values using AIA Document G703.
 - 1) Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.
 - 2. Proposed Project Schedule outlining tasks, phasing, long lead items and building electrical shutdown and start up over a weekend (Friday 8AM – Monday 12PM).

6.11 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternatives as a difference in bid price by adding to or deducting from the base bid price.
- B. Bids will be evaluated on the base bid price, plus consideration of Alternates with bid price adjustments to determine of a successful bidder.

PART 7 - OFFER ACCEPTANCE/REJECTION

7.1 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of thirty (30) days after the bid closing date.

7.2 ACCEPTANCE OF OFFER

- A. Owner reserves the right to accept or reject any or all offers.
- B. After acceptance by Owner, Architect on behalf of Owner, will issue to the successful bidder, a written letter of Contract Award.

END OF SECTION

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AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:

Kingfisher County Courthouse Generator Replacement
Kingfisher, Oklahoma

The Kingfisher County Courthouse Generator Replacement (Project) shall consist of providing Construction Management services on behalf of the Owner for the installation of a facility generator located at the Kingfisher County Courthouse, Kingfisher, Oklahoma.

THE OWNER:

Kingfisher County Commissioners
101 S. Main St., Suite #9
Kingfisher, Oklahoma 73750
Telephone Number: (405) 375-3805

THE ARCHITECT:

(Name, legal status, address, and other information)

Professional Engineering Consultants, PA
1924 S. Utica Ave., Suite 1400
Tulsa, Oklahoma 74104

TABLE OF ARTICLES

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

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

§ 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, to which Work may be added or deleted by 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, or that does not change, 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 and who meets the requirements set forth in the Bidding Documents.

§ 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 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 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 observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Refer to Specification Section 00 21 13

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

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

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

Refer to Specification Section 00 21 13

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 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.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 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.

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

§ 3.3.5 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 Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

Refer to Specification Section 00 21 13

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date 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 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, 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. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Refer to Specification Section 00 21 13

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and 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, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

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

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, 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 best interests.

§ 5.3.2 Unless otherwise prohibited by law, 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 lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

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

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; 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.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

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.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .4 Building Information Modeling Exhibit, if completed:
- .5 Drawings

Number

Title

Date

.6 Specifications

Section	Title	Date	Pages
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.7 Addenda:

Number	Date	Pages
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.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

☐ AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

☐ The Sustainability Plan:

Title	Date	Pages
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☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

Additions and Deletions Report for

AIA® Document A701® – 2018

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:07:32 ET on 09/19/2024.

PAGE 1

~~(Name, location, and detailed description)~~

Kingfisher County Courthouse Generator Replacement
Kingfisher, Oklahoma

The Kingfisher County Courthouse Generator Replacement (Project) shall consist of providing Construction Management services on behalf of the Owner for the installation of a facility generator located at the Kingfisher County Courthouse, Kingfisher, Oklahoma.

...

~~(Name, legal status, address, and other information)~~

Kingfisher County Commissioners
101 S. Main St., Suite #9
Kingfisher, Oklahoma 73750
Telephone Number: (405) 375-3805

...

Professional Engineering Consultants, PA
1924 S. Utica Ave., Suite 1400
Tulsa, Oklahoma 74104

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Refer to Specification Section 00 21 13

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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:07:32 ET on 09/19/2024 under Order No. 2114445249 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 2018, Instructions to Bidders, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 00 25 13
PRE-BID MEETING

A pre-bid conference will be held at the time, date and location specified below:

Date/Time: October 15, 2024, at 10:00 AM

Location: 101S Main Street
Courthouse Conference Room
Kingfisher, OK 73750

Each bidder is specifically advised that attendance at this Pre-bid Conference is not Mandatory. If you cannot attend the pre-bid meeting and want to visit the project site, contact county engineer office (405)375 3820 to schedule an onsite visit.

END OF SECTION

SECTION 00 41 45
BID FORM

PROJECT NAME: _____
PROJECT NUMBER: _____
BIDDER: _____

This Bid is Submitted to: _____

- 1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.
- 2. The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security.
 - B. Supplement to Bids Form.
 - C. Non-Collusion Affidavit
- 3. This Bid will remain subject to acceptance for 30 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.
- 4. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.
- 5. Bidder hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

6. BIDDER shall complete the Work for the following price(s):

KINGFISHER COUNTY COURTHOUSE ELECTRICAL UPGRADE

BASE BID

<u>Item No.</u>	<u>Description</u>	<u>Amount In Figures</u>
1.	Electrical System Upgrade Scope of Work - Demolition of old system and installation of new system. This includes the installation of owner provided generator equipment. This item shall be paid for at the contract lump sum bid.	\$ _____
2.	Mechanical Scope of Work - Installation of gas supply to the new generator system. This item shall be paid for at the contract lump sum bid.	\$ _____
3.	Concrete Scope of Work - Demolition of existing parking lot to install gas supply lines and all related concrete work to restore the parking lot and install equipment pads for new equipment. This item shall be paid for at the contract lump sum bid.	\$ _____
4.	Basement entrance door assembly demolition and door/transom assembly replacement. This item shall be paid for at the contract lump sum bid.	\$ _____
TOTAL BASE BID (in figures)		\$ _____
TOTAL BASE BID (in words)		_____

7. Bidder acknowledges that:
- A. Each Bid Lump Sum Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item.
 - B. The quantities of items of Lump Sum price work are based on the work as included in the contract documents. Adjustments of the quantities shall only occur with a change in the work as set forth in a Change Order.
8. Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
9. Bidder accepts the provisions of the Agreement as to liquidated damages.
10. In submitting this Bid, Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
- A. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

- B. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 - E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
 - F. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 - G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
 - H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.
11. The Bidder certifies the following:
- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
 - B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
 - C. Bidder has not solicited or induced any individual or entity to refrain from bidding.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.: (if applicable) _____

END OF SECTION

PROPOSAL

Kingfisher County Courthouse Electrical Upgrade

A Bidder's Bond, Certified or Cashier's Check is enclosed in the amount of \$ _____ as required.

STATE OF _____)
) SS:
COUNTY OF _____)

_____, of lawful age, being first duly sworn, upon his oath, deposes and says, that he executed the accompanying bid on behalf of the bidder named therein for the construction of the above improvement in KINGFISHER COUNTY, OKLAHOMA, that he had lawful authority so to do and that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any State or County official or employee as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussions between bidders and any State or County officials concerning exchange of money or other thing of value for special consideration in the letting of a contract; said bidder has neither directly nor indirectly entered into any agreement, express or implied, with any bidder or bidders, having for its object the controlling of the price or amount of such bid or bids, the limiting of the bids or bidders, the parceling or farming out to any bidder or bidders, or other persons of any part of the contract or any part of the profits thereof and that he has not and will not divulge the sealed bid on such public improvement to any person whatsoever, except those having a partnership or other financial interest with him in said bid or bids, until after the sealed bid or bids are opened.

If partnership, give name
and address of each partner

By _____

Address: _____

Incorporated under the
laws of the State of: _____

Subscribed and sworn to before me this _____ day of _____ 20____

(SEAL)

Notary Public

My Commission Expires:

BUSINESS RELATIONSHIP AFFIDAVIT
To Accompany Contractor's Bid

STATE OF _____)
) ss:
COUNTY OF _____)

_____(Contractor's Authorized Agent), of lawful age,
being first duly sworn upon his/her oath, states:

1. I am the duly authorized agent of _____(Bidder's Company Name), the bidder submitting the attached competitive bid (the "bid").
2. My position in the above-named company is _____
3. Affiant further states the nature of any partnership, joint venture, or other business relationship presently in effect, or which existed within one (1) year prior to the date of this Affidavit, with the architect, engineer, or other party to the project is as follows:

(if none, so state)

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

(if none, so state)

5. Affiant further states that the names of all persons who have any such business relationship and the positions they hold with their respective companies or firms are as follows:

(if none, so state)

Further, Affiant saith not.

Signature of Authorized Agent

Title (printed)

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

(SEAL)

My commission expires:

Notary Public

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENT, that _____, Principal,
and _____, a corporation organized under the laws of the State of _____
and authorized to transact business in the State of Oklahoma, as Surety, are held firmly bound unto
Kingfisher County, Oklahoma, in the penal sum of _____
Dollars (\$ _____) in lawful money of the United States of America, said sum being the
contract price, for the payment of which, well and truly to be made, we bind ourselves and each of us, our
heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these
presents.

Dated this _____ day of _____, 20____

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written contract with Kingfisher County, Oklahoma,
dated _____, 20____, for:

Kingfisher County Courthouse Electrical Upgrade

all in compliance with the plans and specifications therefor, made a part of said contract and on file in the
Office of the County Clerk, located in the County Courthouse Building in Kingfisher, Oklahoma.

NOW, THEREFORE, if said Principal shall pay or cause to be paid to Kingfisher County, Oklahoma,
all damage, loss, and expense which may result by reason of defective materials and/or workmanship in
connection with said work, occurring within a period of one (1) year from and after acceptance of said
project by Kingfisher County, Oklahoma; then this obligation shall be null and void, otherwise to be and
remain in full force and effect.

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

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

Principal:

By: _____

Title

(SEAL)

ATTEST:

Secretary

Surety:

By: _____

Attorney-in-Fact

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENT, that _____, Principal, and a corporation organized under the laws of the State of _____, and authorized to transact business in the State of Oklahoma, as Surety, are held firmly bound unto Kingfisher County, Oklahoma, in the penal sum of Dollars (\$ _____) in lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

Dated this _____ day of _____, 20____

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written contract with Kingfisher County, Oklahoma, dated _____, 20____, for:

Kingfisher County Courthouse Electrical Upgrade

all in compliance with the plans and specifications therefor, made a part of said contract and on file in the Office of the County Clerk, located in the County Courthouse Building in Kingfisher, Oklahoma.

NOW, THEREFORE, if said Principal shall in all particulars, well, truly, and faithfully perform and abide by said contract and each and every covenant, condition, and part thereof and shall fulfill all obligations resting upon said principal by the terms of said contract and specifications and if said principal shall protect and save harmless Kingfisher County from any pecuniary loss resulting from the breach of any of the items, covenants and conditions of said contract resting upon said principal, then this obligation shall be null and void, otherwise to be and remain in full force and effect.

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

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

Principal:

By: _____

Title

(SEAL)

ATTEST:

Secretary

Surety.

By: _____

Attorney-in-Fact

STATUTORY BOND

KNOW ALL MEN BY THESE PRESENT, that _____ Principal, and
, a corporation organized under the laws of the State of _____, and authorized to transact business in the
State of Oklahoma, as Surety, are held firmly bound unto Kingfisher County, Oklahoma, in the penal sum of
Dollars (\$_____) in lawful money of the United States of America, for the payment of which,
well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees,
successors, and assigns, jointly and severally, firmly by these presents.

Dated this _____ day of _____, 20____

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written Contract with Kingfisher County, Oklahoma, dated
20____, for:

Kingfisher County Courthouse Electrical Upgrade

all in compliance with the plans and specifications therefor, made a part of said contract and on file in the Office of
the County Clerk, located in the County Courthouse Building in Kingfisher, Oklahoma.

NOW, THEREFORE, if said Principal shall fail or neglect to pay all indebtedness incurred by said Principal or
subcontractors of said Principal who performs work in the performance of such contract, for labor and materials and
repairs to and parts of equipment used and consumed in the performance of said contract within thirty (30) days after
the same becomes due and payable, the person, firm, or corporation entitled thereto may sue and recover on this
bond, the amount so due and unpaid.

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

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

Principal:

By: _____
Title

(SEAL)
ATTEST:

Secretary

Surety:

By: _____
Attorney-in-Fact

INVOICE AFFIDAVIT

STATE OF _____)
) SS
COUNTY OF _____)

The undersigned (architect, contractor, supplier, engineer, or supervisory official) of lawful age, being first duly sworn, on oath says that this invoice, claim or contract is true and correct. Affiant further states that the work, services, or materials as shown by this invoice or claim have been completed or supplied in accordance with the plans, specifications, orders or requests furnished to the affiant. Affiant further states that (s) he has made no payment, given or donated or agreed to pay, give or donate either directly or indirectly to any elected official, officer or employee of the State of Oklahoma, of money or any other thing of value to obtain payment or the award of this contract.

Kingfisher County Courthouse Electrical Upgrade

Project No. _____

Signature - Contractor or Supplier

Company Name (Print or Type)

Address

City, State, Zip

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

_____, Notary Public

My Commission Expires: _____

S.A. & 1. 425 (2000)

AFFIDAVIT FOR FILING WITH COMPETITIVE BID

State of Oklahoma) SS

County of Kingfisher)

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

Bidder:

Name:

Address:

Phone Number:

Signature

Subscribed and sworn to before me the _____ day of _____, 20____

Notary Public (or Clerk or Judge)

My commission expires: _____

Note:

Each competitive bid submitted to a county, school district or municipality must be accompanied with the above Affidavit as required by 61 Okla. St. Ann. 138

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SECTION 00 43 73
PROPOSED SCHEDULE OF VALUES FORM

PART 1 - GENERAL

1.1 BID FORM SUPPLEMENT

- A. A completed Proposed Schedule of Values form is required as per section 00 21 13, 7.07.

1.2 PROPOSED SCHEDULE OF VALUES FORM

- A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.
 - 1. Provide completed General Conditions and Fee Matrix.
- B. Arrange schedule of values consistent with format of AIA Document G703.
 - 1. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.

END OF SECTION

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SECTION 00 45 19
NON-COLLUSION AFFIDAVIT
To Accompany Contractor's Bid

STATE OF _____)
) ss:
COUNTY OF _____)

_____ (Contractor's Authorized Agent), of lawful age,
being first duly sworn upon his/her oath, states:

1. I am the duly authorized agent of _____ (Bidder's Company Name), the bidder submitting the attached competitive bid (the "bid"), for the purpose of certifying the facts pertaining to the existence or nonexistence of collusion among bidders or between bidders and municipal officials or employees, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the award of any contract associated with the bid attached to this document;
2. I am fully aware of the facts and circumstances surrounding the making of the bid and have been personally and directly involved in the proceedings leading to the submission of such bid;
3. Neither the bidder nor anyone subject to the bidder's direction or control has been a party to: Any collusion among bidders to restrain the freedom of competition by agreement to bid at a fixed price or to refrain from bidding; Any collusion with any county official or employee as to quantity, quality, or price in the bid or contemplated contract, or as to any other terms of such bid or contemplated contract; nor any discussions between bidders and any county official or employee concerning the exchange of money or other thing of value for special consideration in the award of the contemplated contract.

Further, Affiant saith not.

Signature of Authorized Agent

Title (printed)

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

(SEAL)

My commission expires:

Notary Public

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SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 - GENERAL

1.1 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 00 72 00 - General Conditions for the General Conditions.
- B. See Section 00 7300 - Supplementary Conditions for the Supplementary Conditions.
- C. The Agreement is based on AIA A101.
- D. The General Conditions are based on AIA A201.
- E. The Guide for Supplementary Conditions includes AIA A503.

1.2 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
- B. Bond Forms:
 - 1. Bid Bond Form: AIA A310.
 - 2. Performance and Payment Bond Form: AIA A312.
- C. Post-Award Certificates and Other Forms:
 - 1. Submittal Transmittal Letter Form: AIA G810.
 - 2. Schedule of Values Form: AIA G703.
 - 3. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- D. Clarification and Modification Forms:
 - 1. Architect's Supplemental Instructions Form: AIA G710.
 - 2. Construction Change Directive Form: AIA G714.
 - 3. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

1.3 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2017.
- B. AIA A201 - General Conditions of the Contract for Construction; 2017.
- C. AIA A310 - Bid Bond; 2010.
- D. AIA A312 - Performance Bond and Payment Bond; 2010.

- E. AIA A503 - Guide for Supplementary Conditions; 2007.
- F. AIA G701 - Change Order; 2017.
- G. AIA G702 - Application and Certificate for Payment; 2017.
- H. AIA G703 - Continuation Sheet; 2017.
- I. AIA G704 - Certificate of Substantial Completion; 2017.
- J. AIA G710 - Architect's Supplemental Instructions; 2017.
- K. AIA G714 - Construction Change Directive; 2017.
- L. AIA G810 - Transmittal Letter; 2001.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 00 72 00
GENERAL CONDITIONS

PART 1 - GENERAL

1.1 FORM OF GENERAL CONDITIONS

- A. The General Conditions applicable to this contract is AIA Document A201 - 2017.

1.2 RELATED REQUIREMENTS

- A. Section 00 73 00 - Supplementary Conditions.

1.3 SUPPLEMENTARY CONDITIONS

- A. Refer to document 00 73 00 - Supplementary Conditions for amendments to the general conditions.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Kingfisher County Courthouse Generator Replacement
Kingfisher, Oklahoma

THE OWNER:

(Name, legal status and address)

Kingfisher County Commissioner
101 S. Main St., Suite #9
Kingfisher, Oklahoma 73750
Telephone Number: (405) 375-3808

THE ARCHITECT:

(Name, legal status and address)

Professional Engineering Consultants, PA
1924 S. Utica Ave., Suite 1400
Tulsa, Oklahoma 74104

TABLE OF ARTICLES

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2	OWNER
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10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

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(2053729908)

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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 or proposal 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 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.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 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 retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and 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 the 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 suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, 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 suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 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.

§ 2.3.2 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.

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

§ 2.3.4 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.

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.4 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.

§ 2.5 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 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 default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for 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. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

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 its 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 2.3.4, 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 submit 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, subject to Section 15.1.7, 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. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative 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 approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 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

§ 3.5.1 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.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 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 14 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 that an equitable adjustment be made 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, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim 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 notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice 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 and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably 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, or fails to provide submittals in accordance with the approved 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 make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and 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 how 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect 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 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.

§ 3.12.10.1 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 be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately 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 and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and 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.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 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, 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, or patching shall be restored to the condition existing prior to the cutting, fitting, or 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 construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its 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 and 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 the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with 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 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 an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the 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 Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 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.

§ 4.2 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.

§ 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 promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 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 13.4.2 and 13.4.3, whether or not the 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, 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 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 order 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 Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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 the 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, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice 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 for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, 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 that the Contractor, by these Contract 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; 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 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 term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has 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 notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work 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. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor 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. The Contractor shall proceed promptly with changes in the Work, 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 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine 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 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .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, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 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.

§ 7.3.7 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.

§ 7.3.8 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 may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

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, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 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 (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended 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

§ 9.1.1 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.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and 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 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, suppliers, or other persons or entities that 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 (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole 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 in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. 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. 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 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 suppliers 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 either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 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 supplier 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 Contractor shall reflect such payment on its next Application 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 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 and suppliers 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 or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to 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 or provided by 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, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 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' 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 shutdown, 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; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and 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 the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the 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 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 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. 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 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, (3) a written statement that the Contractor knows of no 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, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and 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, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance 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 the lien, claim, security interest, or encumbrance, 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, corrected, 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 the 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;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a 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, a Subcontractor, or a Sub-subcontractor; 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 implement, 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 the owners and users of adjacent sites and utilities of the safeguards.

§ 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is 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, notice of the 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 and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. 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 notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's 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 the material or substance or who are to perform the task of removal or safe containment of the 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 by the amount of the Contractor's reasonable additional costs of shutdown, 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 hazardous 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 hazardous 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 reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances 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 reimburse 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 Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 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; (2) the Architect and Architect's consultants; and (3) Separate Contractors, 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 those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 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, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement 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 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

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, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 any 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 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 2.5.

§ 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 of the Owner or Separate Contractors, whether completed or partially completed, 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, excluding that jurisdiction's choice of law rules. 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 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 the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 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.

§ 13.3.2 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 thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 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 tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 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 13.4.1, 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 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 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.

§ 13.4.4 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.

§ 13.4.5 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.

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties 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.

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, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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 reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work 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' 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 or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .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 reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner 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' 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 under 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 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 Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

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, a change in the Contract Time, 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. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the 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 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by 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 under this Section 15.1.3.1 shall 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.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 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.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 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.

§ 15.1.6.2 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.

§ 15.1.7 Waiver of 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 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, 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. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a 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 the 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 receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, 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 15.1.7, 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 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 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. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 those of the Owner and Contractor under this Agreement.

Additions and Deletions Report for

AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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PAGE 1

Kingfisher County Courthouse Generator Replacement
Kingfisher, Oklahoma

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Telephone Number: (405) 375-3808

...

Professional Engineering Consultants, PA
1924 S. Utica Ave., Suite 1400
Tulsa, Oklahoma 74104

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:07:32 ET on 09/19/2024 under Order No. 2114445249 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 2018, Instructions to Bidders, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 72 00 - General Conditions and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.2 RELATED SECTIONS

- A. Section 00 50 00 - Contracting Forms and Supplements.
- B. Section 01 42 00 - References.

1.3 REFERENCE STANDARDS

- A. AIA A503 - Guide for Supplementary Conditions; 2007.

1.4 MODIFICATIONS TO GENERAL CONDITIONS

- A. The following supplements modify AIA Document A201-2017, General Conditions of the Contract for Construction. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

1.5 ARTICLE 1 - GENERAL PROVISIONS:

- A. The fourth sentence of Subparagraph 1.1.2 THE CONTRACT shall be modified to read as follows:
 - 1. 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 any Subcontractor, Sub-subcontractor or a Material Supplier and the Architect or the Architect's consultants, (3) between the Owner and a Subcontractor, Sub-subcontractor, or a Material Supplier (4) between the Owner and Architect or the Architect's consultants, or (5) between any persons or entities other than the Owner and Contractor.
- B. Add new Clause 1.1.3.1 to Subparagraph 1.1.3 THE WORK to read as follows:
 - 1. It is agreed that the definition of the term "Work" for the purposes of the Architect's observations of the Work shall not include temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing and other similar items referred to herein as "temporary facilities," material moving equipment to include cranes and elevators, or any other temporary structures or construction equipment or aids, for which the Contractor shall have sole responsibility.

- C. Add the following sentence to the end of Subparagraph 1.1.6 THE SPECIFICATIONS:
 - 1. Other items or requirements related to the Work or the Project may also be included in the Specifications.
- D. Add the following sentences at the end of Subparagraph 1.2.2:
 - 1. Organization of the Drawings and Specifications into a format for easy cross reference by any person or entity is for the specific purpose of convenience only and such cross references shall not be considered as being full and complete. The omission of any cross reference shall not relieve the Contractor of his responsibility to perform all of the Work required by the Contract Documents.
- E. Add new Subparagraph 1.2.4 to Paragraph 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS immediately following Subparagraph 1.2.3 to read as follows:
 - 1. All of the Contract Documents are complementary and do not have a system of precedence. In the event of conflicts or discrepancies among the separate parts of the Contract Documents, or within any one part of the Contract Documents, and subject to the terms of Subparagraph 3.2.1 and Supplementary Clause 3.2.1.1, the Architect shall upon request from the Owner, or Contractor, consistent with Subparagraphs 4.2.11 and 4.2.12, interpret the conflict or discrepancy based upon the Contract Documents as a whole. Should such a conflict or discrepancy occur, it is the specific intent of the Contract Documents to require the better quality or greater quantity of Work be performed and the Architects interpretation shall be consistent with this intent.
- F. Add the following sentence at the end of Paragraph 1.3:

The capitalization of other words or terms, or the failure to capitalize any word or term, throughout the Contract Documents, shall be interpreted to have no meaning and shall be without effect on all interpretations of the Contract Documents.

1.6 ARTICLE 2 - OWNER

- A. Subparagraph 2.3.4 shall be revised to read as follows:

The Owner shall furnish surveys describing the Project Site. The Architect makes no representations to the accuracy or completeness of these surveys. Such surveys may contain descriptions of physical characteristics, legal limitations, utility locations, permanent benchmarks, existing structures, slopes and contours, legal descriptions and other such pertinent information. Such Owner furnished surveys may be bound with the Drawings or may be fully or partially transcribed onto the Plot Plan or Site Plan Drawing. This survey shall be a part of the Drawings and, as such, shall be a part of the Contract Documents.
- B. Add new Subparagraph 2.3.7 immediately following Subparagraph 2.3.6 to read as follows:
 - 1. The Owner's instructions to the Contractor shall be communicated through the Architect.

- C. Add new Subparagraph 2.4.1 to Paragraph 2.4 OWNER'S RIGHT TO STOP WORK to read as follows:
 - 1. The Owners right to stop the Work shall not imply that the Owner, or the Architect, has any duty, obligation or responsibility to determine either the safety of the Contractors means, methods, techniques or sequences, including but not limited to, temporary shoring, bracing, scaffolding, form work, safety barriers, trench bracing, and other similar items, referred to herein as "temporary facilities," or their compliance with the requirements of laws, codes, regulations and safety requirements, which shall be the full and sole responsibility of the Contractor and the Contractor shall solely bear any damages or injury, including death, arising therefrom.
- D. Add new Subparagraph 2.5.1 to Paragraph 2.5 OWNER'S RIGHT TO CARRY OUT THE WORK to read as follows:
 - 1. Should the Contractor fail or refuse to sign the Change Order, and should the Contractor not give written notice of his specific reasons within a seven (7) day period after his receipt of the Change Order, or should the Contractor not accept delivery of the Change Order, a Construction Change Directive for a like amount shall be issued in compliance with Paragraph 7.3 CONSTRUCTION CHANGE DIRECTIVES.

1.7 ARTICLE 3 - CONTRACTOR

- A. Revise words "ANY ERRORS" in the second sentence of Subparagraph 3.2.2 to read as follows: "any open, obvious or patent errors".
- B. Add new Clause 3.2.2.1 immediately following Subparagraph 3.2.2 to read as follows:
 - 1. During his careful study as required in Subparagraph 3.2.2, the Contractor shall note all typographical and spelling errors in the Construction Documents. Any such errors which produce a phrase or sentence in compliance with both well-known technical and trade meanings and common English usage shall not be deemed a typographical or spelling error. All other such typographical or spelling errors will produce phrases or sentences which are inconsistent with well-known technical and trade meanings or common English usage. The Contractor shall report all such errors to the Architect in compliance with Subparagraph 3.2.2.
- C. Revise words "ANY NONCONFORMITY" in the Subparagraph 3.2.3 to read as follows: "any open, obvious or patent nonconformity"
- D. The third sentence of Subparagraph 3.2.4 shall be modified to read as follows:
 - 1. The Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless such errors inconsistencies, omissions or differences were open, obvious or patent and should have been discovered by Contractor during a careful examination of the various Drawings and other Contract Documents.

- E. The second sentence of Subparagraph 3.3.1 shall be modified by adding the words "temporary facilities and safety precautions and programs" immediately following the word "techniques." The second sentence shall be additionally modified by deleting the words, "unless the Contract Documents give other specific instructions concerning these matters."
- F. Add new Clause 3.4.3.1 immediately following Subparagraph 3.4.3 to read as follows:
1. The Contractor shall adopt and maintain a policy strictly prohibiting social contact between the employees of the Contractor, Subcontractors, Sub-subcontractors, Material Suppliers or any other persons for whose acts the Contractor is responsible and any students, regardless of age, or underage employees of the Owner on or around the Project Site. All applicable employees shall be informed of this policy by the Contractor and the Superintendent of the Contractor shall be responsible for enforcement of this policy.
- G. Add new Subparagraph 3.4.4 to read as follows:
1. After the Contract has been executed, the Owner will consider a formal request for the substitution of products, systems, means, methods or designs in place of those specified only under the conditions set forth in the Additional Project Requirements of the Contract Documents. By making requests for substitutions based upon this Subparagraph, the Contractor represents and certifies that:
 - a. He has personally investigated the proposed substitute products, systems, means, methods or designs and has determined that it is equal or superior in all respects to that specified;
 - b. He will provide the same warranty for the substitution that the Contractor would for that specified;
 - c. The cost data presented is complete and includes all related costs under this Contract except the Architects redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent;
 - d. He will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- H. Add new Subparagraph 3.6.1 to read as follows:
1. Certain Public and Non-Profit Organization Owners may be exempt, either wholly or partially, from taxes as defined in Subparagraph 3.6. Where applicable, these exemptions are fully described elsewhere in the Contract Documents.
- I. Subparagraph 3.7.2 shall be modified by adding the following sentences to the end of Subparagraph:
1. Compliance with one or more specific laws, ordinances, rules, regulations and lawful orders of public authorities may be brought to the Contractors specific attention elsewhere in the Contract Documents. The inclusion or omission of any law, ordinance, rule, regulation or lawful order of a public authority shall not relieve the Contractor of his duty, obligation and responsibility for compliance with all laws, ordinances, rules, regulations and lawful orders of public authorities.

J. Add new Clause 3.7.2.1 immediately following Subparagraph 3.7.2 to read as follows:

1. In general, it is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, ordinances, statutes, standards, building codes, rules and regulations. However, building trades licensed by regulatory authority shall be held responsible for full and complete knowledge of all applicable laws, ordinances, statutes, standards, building codes, rules and regulations as they apply to their own licensed trade. Where the Contract Documents specifically direct that portions of the Work be completed in compliance with certain or applicable laws, ordinances, statutes, standards, building codes, rules and regulations, it is the Contractor's duty, obligation and responsibility to diligently and carefully research and study, and to acquire full knowledge of, such laws, ordinances, statutes, standards, building codes, rules and regulations. If the Contractor observes that portions of the Contract Documents are at variance from applicable laws, ordinances, statutes, standards, building codes, rules and regulations, or is informed of such variance by any public authority or other entity, the Contractor shall promptly notify the Architect in writing, and necessary changes shall be accomplished by appropriate Modification. Nothing in these requirements shall relieve the Contractor of his responsibility for compliance with the requirements of the Contract Documents where those requirements exceed those of the applicable laws, ordinances, statutes, standards, building codes, rules and regulations.

K. Add the following sentence at the end of Subparagraph 3.7.3:

1. Claims for additional cost will not be approved by the Owner for changes required to comply with applicable laws, ordinances, statutes, standards, building codes, rules and regulations for those portions of the Work for which the Contractor is required by the Contract for Construction to have knowledge of the applicable laws, ordinances, statutes, standards, building codes, rules and regulations.

L. Add new Subparagraph 3.7.6 immediately following Subparagraph 3.7.5 to read as follows:

1. Applicable laws, ordinances, statutes, standards, building codes, rules and regulations are defined as those laws, ordinances, statutes, standards, building codes, rules and regulations which are in effect on the Bid Date as defined in the Invitation or Advertisement to Bid. Should any applicable law, ordinance, statute, standard, building code, rule or regulation, or interpretation thereof, change during the progress of the Work, and should any such change require the Contractor to perform either more or less work, the Contract Sum and Contract Time shall be appropriately adjusted in compliance with the requirements of ARTICLE 7, CHANGES IN THE WORK.

M. The first sentence of Subparagraph 3.9.1 shall be modified by adding the words "on a full-time basis" immediately after the word "attendance".

N. Add new Subparagraph 3.10.4 immediately following Subparagraph 3.10.3 to read as follows:

1. Nothing in the requirement to submit construction schedules, or to revise such schedules, or any review of such schedules by the Owner or Architect, shall give rise to a duty, obligation or responsibility of the Owner or Architect to any Contractor, Subcontractor, Sub subcontractor, Material Supplier, or any other entity involved in the Work, to insure completion of the Work within the Contract Time. It is the sole duty, responsibility and obligation of the Contractor to complete the Work within the Contract Time.
- O. The second sentence of Subparagraph 3.12.8 shall be modified to read as follows:
1. Specifically informing the Architect in writing of deviations shall be defined as a letter submitted with the Shop Drawing, Product Data, Sample or similar submittal which shall contain the following phrase, "Your attention is directed to the following deviations from the Requirements of the Contract Documents" followed by a detailed written listing of all such deviations. 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. Any portion of the Work which fails to conform to the requirements of the Contract Documents shall be corrected in compliance with Article 12 UNCOVERING AND CORRECTION OF WORK and the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals shall not relieve the Contractor of his duty, obligation and responsibility to make any such required corrections.
- P. Add the following sentence to the end of Subparagraph 3.12.9:
1. Specific attention in writing shall be defined as a letter submitted with the Shop Drawings, Product Data, Sample or similar submittal which shall contain the following phrase, "Your attention is directed to the following revisions which are in addition to those revisions that you requested" followed by a detailed written listing of all such revisions.
- Q. Add new Subparagraph 3.12.11 immediately following Clause 3.12.10.2 to read as follows:
1. Letters of Conformance will not be acceptable in lieu of Shop Drawings or other required submittals.
- 1.8 ARTICLE 4 - ARCHITECT
- A. Add new Clause 4.2.1.1 immediately following Subparagraph 4.2.1 to read as follows:
1. Nothing in the Agreement shall be construed to mean or to imply that the Architect has any duty, obligation or responsibility to supervise the Work.
- B. The first sentence of Subparagraph 4.2.2 shall be modified by adding the words "as a whole" immediately after the words "will visit the site."
- C. The third sentence of Subparagraph 4.2.2 shall be modified by adding the words "temporary facilities" immediately following the word "techniques".
- D. Add new Clauses 4.2.2.1, 4.2.2.2 and 4.2.2.3 immediately following Subparagraph 4.2.2 to read as follows:

1. It is understood that the Architect's observations of the Work shall be conducted on a sampling basis and that the observed samples of the Work, at the time observed, may not be representative of all work by the Contractor in terms of quality and quantity.
2. Nothing in the Agreement shall be construed to mean or to imply:
 - a. That the Architect has any duty, obligation or responsibility to observe the work of any individual Subcontractor, Sub subcontractor, Tradesman, Material Supplier or other person or entity during the progress of that Subcontractor's, Sub Subcontractors, Tradesmen, Material Suppliers or other persons or entities Work.
 - b. That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor every discrepancy, error, instance of work of poor quality and variances from the requirements of the Contract Documents which may be present during any period of observation of the Work. The Architect's failure to observe, note and report to the Contractor any discrepancy, error, instance of work of poor quality or variance from the requirements of the Contract Documents shall not relieve the Contractor of his obligation to perform the work in accordance with the Contract Documents.
 - c. That the Architect has any duty, obligation or responsibility to observe, note and report to the Contractor any discrepancy, error, instance of work of poor quality or variance from the requirements of the Contract Documents at any specific time or period during the progress of the Work. Work shall be corrected under the requirements of Article 12 UNCOVERING AND CORRECTION OF WORK without respect to the time or period when the Work requiring correction was discovered and reported to the Contractor.
 - d. That the Architect has any duty, obligation or responsibility to protect the Contractor or any Subcontractor, Sub Subcontractor, Material Supplier or other person or entity involved in the Work against their own construction errors or other variance from the requirements of the Contract Documents during his observations of the Work.
 - e. That the Architect has any duty, obligation or responsibility to verify the accuracy of Documents and Samples at the Project Site as defined in Subparagraph 3.11.
 - f. That the Architect has any duty, obligation or responsibility to observe those portions of the Work excluded from the definition of the term "Work" in Clause 1.1.3.1
3. 4.2.2.3 Nothing in the Agreement shall be construed to mean or imply that the Architect has any duty, obligation or responsibility to provide for the safety of the Contractor, Subcontractors, Sub-subcontractors, Material Suppliers, or their agents or employees, any other persons performing portions of the work, or any other persons who may be at the Project Site either legitimately or illegitimately.

- E. Add new Clauses 4.2.6.1 and 4.2.6.2 immediately following Subparagraph 4.2.6 to read as follows:
1. 4.2.6.1 The Architect shall not have the authority to reject the Contractor's temporary facilities, construction means, methods, techniques, sequences or procedures or safety precautions and programs.
 2. 4.2.6.2 The Architect shall not have the authority to stop the Work for any reason. The exercise of the Architect's authority to reject Work under Subparagraph 4.2.6 shall in no case be interpreted as an order to stop the Work.
- F. The second sentence of Subparagraph 4.2.7 shall be modified by adding the words, "within the constraints of the Contractor's schedule of submittals and the Architect's current workload." at the end of the sentence.

1.9 ARTICLE 5 - SUBCONTRACTORS

- A. Add new Clause 5.2.1.1 immediately following Subparagraph 5.2.1 to read as follows:
1. The exercise of the Owner's and Architect's authority to make, or not to make, reasonable objection to any proposed person or entity shall not relieve the Contractor of his duty, obligation and responsibility to complete all Work in full compliance with the requirements of the Contract Documents and shall not be construed to mean the approval or rejection of any particular process or material.
- B. Subparagraph 5.2.4 shall be modified by adding a sentence immediately prior to the first sentence to read as follows:
1. The Contractor shall not change a Subcontractor, person or entity previously selected without first notifying the Owner through the Architect of the proposed change in writing and allowing the Owner or Architect reasonable time, after due investigation, to raise a reasonable objection.
- C. Add new Subparagraph 5.3.1 immediately following Paragraph 5.3. to read as follows:
1. 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, attorney's fees, arising out of the Contractor's failure to bind a Subcontractor or Subcontractors to all the terms of the Bidding Documents and the Contract Documents or the Contractor's failure to insure that Subcontractors bind each and every Sub Subcontractor to all the terms of the Bidding Documents or the Contract Documents.
- D. Add new Paragraph 5.5 SUPERINTENDENT and Subparagraph 5.5.1 immediately following Subparagraph 5.4.2 to read as follows:
1. SUPERINTENDENT
 - a. Each Subcontractor and Sub subcontractor shall employ or name a competent Superintendent or Foreman and necessary assistants who shall be in attendance on a full- time basis at the Project Site during the

performance of the Subcontractors or Sub subcontractor's portion of the Work. The Superintendent or Foreman shall represent the Subcontractor or Sub subcontractor, and communications given to the Superintendent or Foreman shall be as binding as if given to the Subcontractor or Sub subcontractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed with written request in each case.

1.10 ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- A. Add new Subparagraph 6.2.6 immediately following Subparagraph 6.2.5 to read as follows:
 - 1. Should a Claim against the Owner be filed by a Separate Contractor alleging damage caused by the Contractor, the Owner shall notify the Contractor of such claim. The Contractor shall defend the Owner in all Claim proceedings at the Owner's expense. Should an award or judgement against the Owner be secured by the Separate Contractor, the Contractor shall pay or satisfy said award or judgement and shall reimburse the Owner for all attorney's fees, arbitration costs, court costs, additional architectural fees, and other costs which the Owner has incurred.

1.11 ARTICLE 7 - CHANGES IN THE WORK

- A. In Subparagraph 7.3.4 delete the phrase "in case of an increase in the Contract Sum," from the first sentence.
- B. The first and second sentences of Subparagraph 7.3.8 shall be modified to read as follows:
- C. The amount of credit or addition for a change which results in a net increase or decrease in the Contract Sum shall be actual net cost as confirmed by the Architect to include a reasonable corresponding adjustment for overhead and profit. When both additions and credits are involved in a change, the overhead and profit allowance shall be calculated on the basis of the net change.
- D. Add new Subparagraph 7.3.11 immediately following Subparagraph 7.3.10 to read as follows:
 - 1. Prior to final payment, all Construction Change Directives issued during the progress of the Work shall be converted into Change Orders and signed by the Contractor. Should the Owner and Contractor fail to agree with the determination made by the Architect concerning adjustments in the Contract Sum and the Contract Time, or otherwise fail to reach agreements upon the adjustments, a controversy shall exist and such controversy shall be submitted to arbitration in compliance with the requirements of Paragraph 15.4 ARBITRATION.
- E. Add new Paragraph 7.5 EXPEDITION immediately following Paragraph 7.4. to read as follows:

1. EXPEDITION

- a. The Contractor shall not proceed with Changes in the Work authorized under Paragraphs 7.2 or 7.3 until receipt of the appropriate signed documents.
- b. It is recognized that under certain circumstances, changes in the Work, if not processed expeditiously, may delay or endanger the Work. Upon certification by the Architect that unacceptable delay may be caused, or that the Work may be endangered, the Owner may authorize the Contractor to immediately proceed with a Change in the Work. All such authorizations will contain an estimated change in the Contract Sum and an estimated change in the Contract Time. The Contractor shall proceed promptly with the Change in the Work upon receipt of such authorization. Final determination of the changes in the Contract Sum and Contract Time shall be made in a reasonable time and the authorization shall be converted into a Change Order or a Construction Change Directive.

1.12 ARTICLE 8 - TIME

- A. Add new Clauses 8.1.4.1 and 8.1.4.2 immediately following Subparagraph 8.1.4 to read as follows:
 1. Calendar Day shall be defined as a continuous twenty-four (24) hour period beginning at 12:00 o'clock midnight.
 2. Working day, if used, shall be defined as a Calendar Day, exclusive of Saturdays, Sundays and Federal Holidays when weather or other conditions beyond the Contractor's control do not prevent the completion of at least four (4) hours of work on the principal unit of work underway between the hours of 7:00 o'clock AM and 6:00 o'clock PM local time.

1.13 ARTICLE 9 - PAYMENTS AND COMPLETION

- A. Add new Clause 9.3.1.3 immediately following Clause 9.3.1.2 to read as follows:
 1. Until Substantial Completion, the Owner shall pay ninety percent (90%) of the amount due the Contractor on account of progress payments unless otherwise provided by statute.
- B. Add new Clause 9.3.2.1 immediately following Subparagraph 9.3.2 to read as follows:
 1. On each and every Application and Certificate for Payment upon which the Contractor applies for payment for materials stored on the Project Site but not yet incorporated into the Work, or applies for payment for materials stored off the Project Site, the Contractor shall include a statement as follows: "At time of payment, for value received, the Contractor and applicable Subcontractors, Sub Subcontractors and Material Suppliers, jointly and severally, hereby sell, assign or transfer unto the Owner the property described as stored materials on this Application and Certificate for Payment and do hereby warrant the Title to said property and do hereby certify that said property is free of all liens and encumbrances." Should this statement not be included with the Application and Certificate for Payment, it shall be included by reference with the same force and

effect as if it had been written thereon unless the Contractor states his reasons in writing for omitting the statement.

- C. Subparagraph 9.4.2 shall be modified by adding the words, "temporary facilities" immediately after the word "techniques" in the fourth sentence.
- D. Add new Subparagraph 9.5.5 immediately following Subparagraph 9.5.4 to read as follows:
 - 1. The Owner shall have the right to act as Agent for the Contractor in disbursing such funds as have been withheld pursuant to Paragraph 9.5 to the party or parties entitled to payment therefrom. The Owner shall render the Contractor an accounting of funds so disbursed.
- E. Add new Clauses 9.8.1.1 and 9.8.1.2 immediately following Subparagraph 9.8.1 to read as follows:
 - 1. All inspections required by Federal, State or Local Regulatory Authorities shall be complete prior to the issuance of the Certificate of Substantial Completion unless specifically noted elsewhere. When so required by the Regulatory Authority, the Contractor shall also obtain and submit to the Architect a Use or Occupancy Permit prior to the issuance of the Certificate of Substantial Completion. It is the Contractor's responsibility to determine or ascertain what inspections are required, to schedule all such inspections, and to notify the Architect of the time and date of all such inspections a minimum of seven (7) days prior to the inspection date.
 - 2. Should any regulatory inspection disclose any Work which is not in compliance with the Contract Documents, the Contractor shall, prior to the issuance of the Certificate of Substantial Completion, complete or correct such Work promptly. The Contractor shall then schedule another inspection by the appropriate regulatory authority and notify the Architect of the time and date of such reinspection.
- F. The first sentence of Subparagraph 9.8.2 shall be modified by adding the phrase "and after all regulatory inspections are complete and, if required, a Use or Occupancy Permit is obtained" immediately following the words "is substantially complete".
- G. Subparagraph 9.8.4 shall be modified by deleting the words "and insurance" from the first sentence.
- H. Add new Subparagraph 9.8.6 immediately following Subparagraph 9.8.5 to read as follows:
 - 1. Unless otherwise agreed upon in writing, the issuance of a Certificate of Substantial Completion shall not constitute acceptance of Work not in compliance with the requirements of the Contract Documents.

1.14 ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

- A. Add new Clause 10.2.4.1 immediately following Subparagraph 10.2.4 to read as follows:

1. When use or storage of explosives or other hazardous materials or equipment are necessary, the Contractor shall give the Owner reasonable advance notice prior to using or storing such hazardous materials.
- B. Subparagraph 10.2.7 shall be revised to read as follows:
1. The Contractor shall be solely responsible for designing and providing all necessary bracing, shoring and tying of all structures, decks and framing and for all other temporary facilities. The Contractor shall adequately brace, shore or otherwise support all elements of the Work to prevent any structural failure which could result in damage to the Work, property or injury or death to persons. The Contractor shall not load or permit any part of the Project or Project Site to be loaded so as to endanger its safety.
- C. Add new Clause 10.2.7.1 immediately following Subparagraph 10.2.7 to read as follows:
1. The Contractor shall be solely responsible for the adequacy and safety of all hoisting equipment and scaffolding.
- D. Add the following sentence to Subparagraph 10.3.2 at the end of the paragraph:
1. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, or by mediation or arbitration under Paragraph 15.3 MEDIATION and Paragraph 15.4 ARBITRATION, which shall be commenced upon demand by either party without the necessity of a determination by the Architect.
- E. Add new Clause 10.3.2.1 immediately following Subparagraph 10.3.2 to read as follows:
1. Asbestos shall be defined as Asbestos Containing Building Material (ACBM) which contains one percent (1%) or greater of Asbestos as determined by the Polarized Light Microscopy Analysis (PLM), within the meaning of Public Law 99 519 together with the United States Environmental Protection Agency Regulations, Section 763.83 promulgated October 30, 1987, Federal Register, Volume 52, No. 210 defining Asbestos Containing Building Material (ACBM) As modified or supplemented on the Bid Date.

1.15 ARTICLE 11 - INSURANCE AND BONDS

- A. Subparagraph 11.3.1 shall be modified by deleting the word "Owner"
- B. Add new Clause 11.3.1.1 immediately following Subparagraph 11.3.1 to read as follows:
1. The Owner and Contractor intend that all policies provided in response to the property insurance provisions of the Agreement shall protect all the parties insured and shall provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insured or additional insured.

1.16 ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK
(Not Supplemented)

1.17 ARTICLE 13 - MISCELLANEOUS PROVISIONS

- A. Add the following sentence immediately following the first sentence of Subparagraph 13.4.2.
- B. Should the Contractor fail to, or refuse to, make arrangements for such additional testing, the Owner may, after written notice to the Contractor, make arrangements for such additional testing.
- C. The first sentence of Subparagraph 13.4.3 shall be modified by adding the words "cost of testing" after the phrase "of repeated procedures".
- D. Add new Paragraph 13.6 immediately following Clause 13.5.to read as follows:

1. OVERTIME WORK

- a. All Overtime Work as defined by Federal and State Statue required to complete the Work in the Contract Time shall be included in the Contract Sum and the Contractor shall work overtime as required to complete the Work within the Contract Time. The Contract Sum shall not be adjusted for overtime work required to complete the Work in the Contract Time.
- b. The Owner may order, in writing, additional Overtime Work to be performed. The Owner shall bear all costs of such Overtime Work and the Contact Sum shall be adjusted as provided in ARTICLE 7 - CHANGES IN THE WORK.

1.18 ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

- A. Add new Clause 14.2.1.5 to Subparagraph 14.2.1 immediately following Clause 14.2.1.4 to read as follows:
 - 1. is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency.

1.19 ARTICLE 15 – CLAIMS AND DISPUTES

- A. Add new Clauses 15.1.6.2.1, 15.1.6.2.2 and 15.1.6.2.3 immediately following Clause 15.1.6.2 to read as follows:
 - 1. The Contractor shall diligently and carefully research and study weather records for the Project Site for the purpose of determining the anticipated number of adverse weather days which will be encountered during the progress of the Work. An adverse weather day is defined as a day for which the temperature falls below 32°F or precipitation of 0.50 inches or more occurs such that the completion of at least four hours of work on the principal unit of work underway, between the hours of 7:00 o'clock A.M. and 6:00 o'clock P.M., local time, is not possible. This data shall be included with any claim submitted under Clause 15.1.6.2. Weather days for that month have been exceeded. Normal adverse Weather Days shall be as

3.6 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 5 days before receipt of bids.
- B. When a request to substitute a product is made, Architect may approve the substitution and will issue an Addendum to known bidders.
- C. The submission shall provide sufficient information to determine acceptability of such products.
- D. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- E. Provide products as specified unless substitutions are submitted in this manner and accepted.
- F. See Section 01 25 00 - Substitutions Procedures for additional requirements.
- G. See Section 01 60 00 - Product Requirements for additional requirements.

PART 4 - SITE ASSESSMENT

4.1 SITE EXAMINATION

- A. Examine the project site before submitting a bid.
- B. On request, the Owner will provide each Bidder access to the site to conduct investigations and tests a Bidder deems necessary for submission of his Bid.
- C. Bidders shall promptly notify Architect of any ambiguity, inconsistency, or error which they may discover upon examination of the site and local conditions.
- D. The submission of a Bid will constitute an incontrovertible representation by the Bidder that he has complied with every requirement of this Section and that the Bidding Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

4.2 PREBID CONFERENCE

- A. Architect along with representative of Owner will conduct a Prebid Conference for this project at Kingfisher County Courthouse 101 S. Main Street, Conference Room 101, Kingfisher, OK., refer to 00 25 13 Pre-Bid Meeting.
- B. Architect and his consultants, as applicable, shall be represented. Prospective Bidders, Prospective Subcontractors, and Prospective Vendors are encouraged to attend and should be prepared to ask questions regarding substitutions and to request clarification of the Bidding Documents. The failure of a Bidder, Subcontractor, or Vendor to attend shall be interpreted to mean that the Bidding Documents are clear and acceptable to all non-participants at the Prebid Conference. Such clarity and acceptability shall be presumed with respect to all Bidders.

- C. Questions and requests for clarification presented in written form will receive written response, and if warranted, issued as Addenda. No verbal response shall be binding.

PART 5 - QUALIFICATIONS

5.1 EVIDENCE OF QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, license to perform work in the State.

5.2 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
- B. Refer to General Conditions and Supplementary Conditions.

PART 6 - BID SUBMISSION

6.1 BID DEPOSITORY

- A. The five percent (5%) Bid Depository system of bid collection shall be used for all trades.
- B. The rules and regulations of this bid deposit system, in force on the day of bid submission shall apply.

6.2 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
 - 1. No other party, Owner, or Architect, etc. is responsible for making sure the submitted Bid is delivered to the location where the Bid will be opened and read aloud, no exception.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed, and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside.
- C. Incomplete bid submission may be the cause to reject the Bid Form and declare the bid invalid or informal.
- D. An abstract summary of submitted bids will be made available to all bidders following bid opening.

6.3 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

SECTION 01 11 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 under separate contracts.
4. Salvage requirements.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. 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 WORK COVERED BY THE CONTRACT DOCUMENTS

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

1. Installation of a facility generator.

- B. The Work is located at:

1. 101 South Main Street, Kingfisher, OK 73750

- C. The Work will be constructed for:

1. Kingfisher County Commissioners

- D. The Partner in Charge is Professional Engineering (PEC):

1. The Project Engineer is Taylor Day
2. The Project Manager is Joe Mandrino

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a Single Prime contract.

1.5 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.

1.6 SALVAGE REQUIREMENT

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Unless otherwise indicated, all equipment that must be removed due to interference with work of this contract remains the property of the Owner, and may be salvaged at the Owner's discretion.
- C. Owner wishes to salvage, and reinstall the following equipment below. Drawings also may indicate items to be salvaged and stored on Owner's premises and the location of storage. Coordinate all salvage activities with Architect.
- D. Materials and/or items scheduled above for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

1.7 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections. Furnish all labor, materials, equipment and incidentals necessary to accommodate the equipment or items furnished by the Owner.
- B. Owner-Furnished and Contractor-Installed Products
 - 1. The Contractor shall be responsible for all rough-in required for the item; all final connections required for the item; the placement of the item in its proper location within the Project; and all patch and repair work required.
 - 2. The Contractor shall also be responsible for coordinating a delivery date with the Owner, scheduled with adequate lead time for ordering and delivery such to prevent delays in the Work.
 - 3. The Owner shall be responsible for supplying the information pertinent to the rough-in requirements for the item and for having the item delivered to the Project Site at such time as to prevent delays in the Work in compliance with the Contractors schedule.
 - 4. Owner-Furnished and Contractor-Installed items are denoted <OFCI> in the Contract Documents.
- C. Owner-Furnished and Installed Products
 - 1. The Contractor shall be responsible for rough-in required for the item.

2. The Owner shall furnish all information concerning special rough-in requirements, if applicable. The Owner shall be responsible for placement to the item in its final position and any patch and repair required.
3. Owner furnished and installed items are denoted <NIC> in the Contract Documents.

1.8 CONTRACTORS USE OF SITE AND PREMISES

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of Project site to work in areas as indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet (12.2 m) beyond building perimeter; 10 feet (3 m) beyond surface walkways, patios, surface parking, and utilities less than 12 inches (300 mm) in diameter; 15 feet (4.5 m) beyond primary roadway curbs and main utility branch trenches; and 25 feet (7.6 m) beyond constructed areas with permeable surfaces (such as pervious paving areas, storm water detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
- C. Provide access to and from site as required by law and by Owner:
 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 2. Do not obstruct roadways, sidewalks, Entrance or other public ways without permit. Keep driveways 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.
- D. Existing building spaces may not be used for storage.
- E. Utility Outages and Shutdown:
 1. Limit disruption of utility services to hours the building is unoccupied.
 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 3. Prevent accidental disruption of utility services to other facilities.

1.9 OWNER OCCUPANCY

- 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. Architect 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, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.
- C. The Owner will occupy the Project after Substantial Completion. Should the Owner require occupancy and occupy the Project prior to issuance of Substantial Completion Certificate, Contractor shall not consider this act an acceptance of any deficient work or deem the project substantially complete.

1.10 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 existing building to normal business working hours of 8 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.
 - 1. **Weekend Hours: Electrical and Generator System switchover will be conducted from Friday 8:00 AM through Monday at 12:00 PM. Contractor**

will “man” as many 8-hour shifts as necessary to complete the switch over within the time allotted. Switch over date TBD.

- 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 Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner'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 Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: the project site is a non-smoking building. Smoking is not permitted within the building or on the construction site.
- F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building or on Project site is not permitted.

1.11 OTHER FEATURES

- A. At the completion of all work periods the work area shall be cleared, all tools, equipment, materials and other items removed from the work area.
- B. Prior to leaving the Project Site at the completion of any work period, take special precautions to insure that the facilities of the Owner have been fully and completely secured.

1.12 SPECIAL PAYMENT PROCEDURES

- A. The date for each progress payment should be determined collaboratively by the Contractor, Owner, and Architect during the initial construction meeting unless such date is indicated in the Agreement between Owner and Contractor.
 - 1. Schedule of Values:
 - a. Contractors will submit monthly schedule of unit prices of various parts of the work within ten (10) days after the contract is awarded. Schedule shall be a complete breakdown of labor and materials required for the job showing quantities and unit prices. The whole aggregating the total monthly sum of the contract. The schedule when approved by the Board shall be used as a basis for monthly payments to the contractor. In applying for payments the contractor's statement shall be broken down in conformity with this schedule.

2. Scope of Payment:

- a. The contractor shall receive and accept the compensation as herein provided, monthly as invoiced for full payment for furnishing all labor, materials, equipment and incidentals, for performing all work contemplated and embraced under the contract; for all loss of damage arising out of the nature of the work or from the action of the elements, for any unforeseen defects or obstructions which may arise or be encountered during the prosecution of the work and before its final acceptance by the Board; for all risks of every description connected with the prosecution of the work; for all expenses incurred by or in consequence of suspension or discontinuance of such prosecution of the work as herein specified; for any infringement of patents, trademarks or copyrights and for completing the work in an acceptable manner according to the plans and specifications.

The payment of any current or partial estimate prior to final acceptance of the work by the owner shall in no way constitute an acknowledgement of the acceptance of the work nor in any way prejudice or affect the obligation of the contractor to repair, correct, renew, or replace at his expense any defects or imperfections in the construction of the work under the contract and its appurtenances nor any damage due to or attributed to such defects, which defects, imperfections or damage shall have been discovered on or before the final inspection and acceptance of the work. The Board shall be the sole judge of such defects, imperfections or damage and the contractor shall be liable to the owner for failure to correct the same as provided herein

3. Payment for Extra Work:

- a. The extra work done by the contractor as authorized and approved by the Board, will be paid for in the manner hereinafter described and the compensation thus provided shall be accepted by the contractor as payment in full for all labor, materials, tools, equipment and incidentals, and all superintendents and timekeepers services, all insurance and all other overhead expense incurred in the prosecution of the extra work.
- b. Payment for extra work will be made by one or more of the following methods:

- 1) Unit prices agreed on in writing by the Board and the contractor and approved by the Board before said work is commenced, subject to all other conditions of the contract.
- 2) A lump sum price agreed on in writing by the Board and the contractor and approved by the Board before said work is commenced, subject to all other conditions of the contract
- 3) The actual cost including labor, materials, tools, equipment and field supervision of such extra work plus fifteen percent (15%) which ten percent (10%) is hereby understood and agreed to include all overhead expense and profits, when agreed upon in writing by the Board and the contractor, and approved by the Board before said work is commenced; subject to all other conditions of the contract.

- B. Architect cannot assure timely submission of Payment Requests received after the date noted in <A1> above.
- C. Allow up to one week for Architect submit Payment Request to Owner before Thursday of the week and put on the following Monday commissioner's meeting agenda for approve.
- D. Upon approve, Payment request will be made to the Contractor

1.13 CONSTRUCTION OCCUPANCY

- A. The Construction Occupancy Date shall be the date of the Notice to Proceed.

1.14 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Unless otherwise noted, all provisions of the sections of division 01 General Requirements apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

1.15 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.
 - 3. Any details specified in the specifications but not depicted in the drawings, or vice versa, shall be treated as if they were present in both. If any clarification or additional information is required, an RFI (Request for Information) per section 01 31 00 should be prepared and submitted to the architect.
 - 4. In case of any inconsistency, any apparent difference, or any other apparent discrepancy in drawings, in specifications, or between drawings and specifications, the interpretation by the Architect that best aligns with the project's intention will prevail. No modifications to the contract price will be granted in this situation unless the contractor explicitly specified what was included in the bid form.
- 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 the Drawings are described in detail in the Specifications. One or more of the following are used on the 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.

D. SEQUENCING OF WORK

1. The Work shall proceed continuously from the Notice to Proceed until Final Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED AND CONTRACTOR-INSTALLED PRODUCTS:

- A. Generac industrial gaseous engine driven generator, turbocharged/after cooled 12 cylinder, 25.8L engine.

2.2 OWNER-FURNISHED AND INSTALLED PRODUCTS:

- A. Not Used

2.3 CONTRACTOR-FURNISHED AND OWNER-INSTALLED PRODUCTS:

- A. Not Used

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with all applicable codes, ordinances and requirements specified within the project plans and specifications.
- B. Installation, where required, shall be complete, in accordance with manufacturer's written instructions and the best practices and standards of the trade involved.

END OF SECTION

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SECTION 01 20 00
PRICE AND 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 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate 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. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect per 00 20 13.
 - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
 - 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- B. Format and Content: Use 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. Form to be used: AIA Form G702 and AIA Form G703 -Application and Certification for Payment Continuation Sheet.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. 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 required, include evidence of insurance.
6. 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 to achieve the total for the item. Use information indicated in the Contract Documents to determine quantities.
7. 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.
8. 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. a. Include each Change Order as a new line item.
9. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
10. Forms filled out by hand will not be accepted.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect 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 should be determined collaboratively by the Contractor, Owner, and Architect during the initial construction meeting unless such date 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.
 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect and Owner.

- C. Application for Payment Forms: AIA Form G702 and AIA Form G703 -Application and Certification for Payment Continuation Sheet.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect 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 for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
 - 5. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
 - 6. Forms filled out by hand will not be accepted.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit either four signed and notarized original hard copies or digital copy in PDF format of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Digital copy or one hard copy shall include waivers of lien and similar attachments.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. 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 conditional 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 conditional 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: Conditional Lien Waiver and Release on Progress Payment-G901-2022, Conditional Waiver and Release on Final Payment-G903-2022.
- H. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- I. 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 (preliminary if not final).
 5. Schedule of unit prices.
 6. Submittal 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.
- J. Application for Payment at Substantial Completion: After Architect issues 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 Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements as specified in Section 01 70 00, 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.

1.5 CONTRACT MODIFICATION PROCEDURES

- A. Owner-Initiated Proposal Requests: Architect 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 Architect are not instructions either to stop work in progress or to execute the proposed change.
 2. Within time specified in Proposal Request or 14 days, when not otherwise specified, 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 Architect.
 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 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 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

C. Administrative Change Orders

1. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
2. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - a. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - b. Promptly execute the change.
3. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 15 days.
4. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.
5. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - a. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 - b. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
 - c. For pre-determined unit prices and quantities, the amount will base on the fixed unit prices.
 - d. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
6. Substantiation of Costs: Provide full information required for evaluation.
 - a. On request, provide following data:
 - 1) Quantities of products, labor, and equipment.
 - 2) Taxes, insurance, and bonds.
 - 3) Overhead and profit.
 - 4) Justification for any change in Contract Time.
 - 5) Credit for deletions from Contract, similarly documented.
 - b. Support each claim for additional costs with additional information:
 - 1). Origin and date of claim.
 - 3). Time records and wage rates paid.
 - 2) Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 - c. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

7. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
8. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
9. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
10. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for measurement and payment of all bid items indicated on the bid form.

1.2 PROCEDURES

- A. The total bid for each section of the contract shall cover all work shown on the drawings and required by the specifications and other contract documents. All costs in connection with the work, including furnishing of all materials, equipment, supplies, and appurtenances; providing all construction plant, equipment, tools, and incidentals; and performing of all necessary labor to fully complete the work, shall be included in the unit and lump sum prices named in the Bid Form. No item that is required by the Contract Documents for the proper and successful completion of the work will be paid for outside of or in addition to the prices submitted in the Proposal. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices named in the Bid Form.
- B. All incidental, subsidiary and miscellaneous items of work essential to completion of the project in a satisfactory manner shall be done at no additional cost to the Owner. Some, but not all, of the items that shall be considered incidental or subsidiary are as follows:
1. The support, protection and maintenance of existing utilities such as power and telephone poles, sanitary sewers, manholes, storm drains and other such items that are to be maintained in place, before, during, and after construction of the proposed improvements.
 2. Removal of structures or obstructions required to complete the work as indicated on the drawing.
 3. Relocation of existing utilities where indicated on the drawings.
 4. Other items as noted in these specifications or on the drawings that do not have a specific associated bid item.
- C. MOBILIZATION
1. This item shall be paid for at the contract lump sum price bid. The lump sum price bid shall be considered full compensation for the Contractor's efforts to transport and set up on site personnel, equipment, supplies and incidentals, and other work and operations which must be performed, or costs incurred prior to beginning actual work on the various items in the contract.
- D. BASE BID
1. Electrical System Upgrade Scope of Work - Demolition of old system and installation of new system. This includes the installation of owner provided generator equipment. This item shall be paid for at the contract lump sum bid.

2. Mechanical Scope of Work - Installation of gas supply to the new generator system. This item shall be paid for at the contract lump sum bid.
3. Concrete Scope of Work - Demolition of existing parking lot to install gas supply lines and all related concrete work to restore the parking lot and install equipment pads for new equipment. This item shall be paid for at the contract lump sum bid.
4. Basement entrance door assembly demolition and door/transom assembly replacement. This item shall be paid for at the contract lump sum bid.

E. TRENCHING AND BACKFILLING

1. This item shall be paid for at the contract lump sum bid, at trench depths listed as measured along the center line of the pipe. The trench depths shall be measured from original ground to the invert of the pipe for all types regardless of bedding and backfill used or specified. The Lump Sum price bid shall be considered full compensation for excavation, disposal of surplus materials, bedding, initial backfill, final backfill, compaction, and for all other materials, equipment, tools, labor, and incidentals necessary to complete the work.

PART 1 - PRODUCTS
NOT USED

PART 2 - EXECUTION
NOT USED

END OF SECTION

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SECTION 01 25 00
SUBSTITUTIONS 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 substitutions.
- B. Related Section:
 - 1. Section 01 21 00 - Allowances for products selected under an allowance.
 - 2. Section 01 23 00 - Alternates for products selected under an alternate.
 - 3. Section 01 60 00 - Product Requirements for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. During the Bidding Phase Substitution Request Form: CSI Form 1.5C
 - 2. After the Bidding Phase Substitution Request Form: CSI Form 13.1A.
 - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate subcontractors that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of CM's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution will not adversely affect Contractor's construction schedule.
 - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - d. Requested substitution is compatible with other portions of the Work.
 - e. Requested substitution has been coordinated with other portions of the Work.
 - f. Requested substitution provides specified warranty.
 - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution will not adversely affect CM's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.

- f. Requested substitution is compatible with other portions of the Work.
- g. Requested substitution has been coordinated with other portions of the Work.
- h. Requested substitution provides specified warranty.
- i. If requested substitution involves more than one subcontractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all subcontractors involved.

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

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 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Site mobilization meeting.

1.3 PROJECT COORDINATION

- A. Project Coordinator: Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for vehicle access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Closeout submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Contractor will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 5. Procedures and processing of field decisions, submittals, and substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 6. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.2 SITE MOBILIZATION MEETING

- A. Contractor will schedule a meeting at the Project Site prior to Contractor Occupancy.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. CM's Superintendent.
 - 5. Major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements and occupancy prior to completion.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.

7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

END OF SECTION

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SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Prior to beginning construction, 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 telephone numbers, and e-mail addresses for each person listed. Provide names and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Post at project site. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

- 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.

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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI.
1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor 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 information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Project Manager – Joe Mandrino.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: RFI shall be submitted on a form acceptable to Engineer.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
 2. Form shall include space for response by the Engineer.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 12:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
 3. Engineer'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.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 3 days of receipt of the RFI response.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated. Contractor is responsible for the preparation of the agenda and meeting minutes associated with each project meeting unless otherwise indicated by the Engineer.
 1. Invitees: Engineer, Owner, the Superintendent, one person representing Contractor's office management and all subcontractors.
 2. Notification: Inform participants and others involved, and individuals whose presence is required, or date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
 3. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 4. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, within three days of the meeting.
- B. Preconstruction Conference: Engineer will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement.

1. Invitees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. 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. Project Contacts
 - 1) Owner's Representative
 - 2) Contractor's Superintendent
 - 3) Subcontractors
 - 4) Permits
 - b. Coordination
 - 1) Utilities
 - 2) List of Emergency Numbers and Contact Persons
 - 3) Other Contractors
 - 4) Owner's Use of Building(s)/Site
 - 5) Permits
 - 6) Safety
 - c. Contract Documents
 - 1) Contract Status
 - 2) Notice to Proceed
 - 3) Additional Sets for Contractor and Others
 - 4) Sales Tax Exemption Status
 - 5) Other
 - d. Contract Administration
 - 1) Owner - Engineer - Contractor Relationships
 - a) Owner - Engineer - Contractor Relationships
 - b) Lines of Communications
 - c) Issue Resolution
 - 2) Construction Progress Schedule
 - 3) Substantial Completion - Date
 - 4) Final Acceptance - Date
 - 5) Liquidated Damages (Substantial Completion)
 - 6) Liquidated Damages (Final Completion)
 - 7) Request for Information
 - 8) Request for Material Substitution
 - 9) Extra Work Claims
 - 10) Change Orders - Procedure and Form
 - 11) Partial Payments
 - a) Frequency
 - b) Procedure and Form

- c) Payment Schedule
 - d) Materials Stored
 - e) Retainage
 - e. Quality Control and Submittals
 - 1) Shop Drawings
 - 2) Material Submittals
 - 3) Mix Designs
 - 4) List of Material Suppliers
 - f. Special Considerations
 - 1) Staging area and construction office site
 - 2) Waste Sites
 - 3) Discussion of Construction
 - 4) Site Access/Haul Routes
 - 5) Contractor Parking
 - 6) Construction Phase/Sequence
 - 7) Contractor's Working Hours
 - 8) Safety
 - 9) Traffic Control
 - 10) Sediment/Erosion Control
 - 11) Miscellaneous
 - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Progress Meetings: Conduct progress meetings at weekly regular intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, Project Manager, and Engineer, 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. 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.
 - 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) Temporary facilities and controls.
 - 6) Quality and work standards.
 - 7) Status of correction of deficient items.
 - 8) Field observations.
 - 9) Status of RFIs.
 - 10) Status of Change Orders.
 - 11) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- 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.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION (Not Used)

Not Used

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SECTION 01 31 14
FACILITY SERVICES 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 SECTION INCLUDES

- A. Coordination documents.

1.3 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Additional requirements for coordination.
- B. Section 01 60 00 - Product Requirements: Spare parts and maintenance materials.
- C. Section 01 78 00 - Closeout Submittals: Project record documents.
- D. Section 01 79 00 - Demonstration and Training: Demonstration and Training.

1.4 MECHANICAL AND ELECTRICAL COORDINATOR

- A. The Contractor will employ and pay for services of a person, technically qualified and administratively experienced in field coordination of the type of work required to be coordinated, for the duration of the Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - PART 3 - EXECUTION

3.1 COORDINATION REQUIRED

- A. Coordinate the work listed below:
 - 1. Concrete: Division 3.
 - 2. Thermal and Moisture Protection: Division 7.
 - 3. Openings: Division 8.
 - 4. Finishes: Division 9.
 - 5. Plumbing: Division 22.
 - 6. Electrical: Division 26.
 - 7. Earthwork: Division 31.
 - 8. Exterior Improvements: Division 32.

- B. Coordinate progress schedules, including dates for submittals and for delivery of products.
- C. Conduct meetings among subcontractors and others concerned, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.
- D. Participate in progress meetings. Report on progress of work to be adjusted under coordination requirements, and any required changes in schedules. Transmit minutes of meetings and reports to concerned parties.

3.2 COORDINATION DOCUMENTS

- A. Prepare coordination drawings to organize installation of products for efficient use of available space, for proper sequence of installation, and to identify potential conflicts.
- B. Prepare a master schedule identifying responsibilities for activities that directly relate to this work, including submittals and temporary utilities; organize by specification section.
- C. Identify electrical power characteristics and control wiring required for each item of equipment.
- D. Maintain documents for the duration of the work, recording changes due to site instructions, modifications or adjustments.

3.3 COORDINATION OF SUBMITTALS

- A. Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination with related work. Transmit copies of reviewed documents to Architect.
- B. Check field dimensions and clearances and relationship to available space and anchors.
- C. Check compatibility with equipment and work of other sections, electrical characteristics, and operational control requirements.
- D. Check motor voltages and control characteristics.
- E. Coordinate controls, interlocks, wiring of switches, and relays.
- F. Coordinate wiring and control diagrams.
- G. When changes in the work are made, review their effect on other work.
- H. Verify information and coordinate maintenance of record documents.

3.4 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS

- A. Review proposals and requests for substitution prior to submission to Architect.
- B. Verify compliance with Contract Documents and for compatibility with work of other sections.

- C. Submit with recommendation for action.

3.5 OBSERVATION OF WORK

- A. Observe work for compliance with Contract Documents.
- B. Maintain a list of observed deficiencies and defects; promptly submit.

3.6 DOCUMENTATION

- A. Observe and maintain a record of tests. Record:
 - 1. Specification section number and product name.
 - 2. Name of Contractor, subcontractor.
 - 3. Name of testing agency and name of inspector.
 - 4. Name of manufacturer's representative present.
 - 5. Date, time, and duration of tests.
 - 6. Type of test, and results.
 - 7. Retesting required.
- B. Assemble background documentation for dispute and claim settlement.
- C. Submit copies of documentation to Architect upon request.

3.7 EQUIPMENT START-UP

- A. Verify utilities, connections, and controls are complete and equipment is in operable condition as required by Section 01 77 00.
- B. Observe start-up and adjustments, test run, record time and date of start-up, and results.
- C. Observe equipment demonstrations made to Owner; record times and additional information required for operation and maintenance manuals.

3.8 INSPECTION AND ACCEPTANCE OF EQUIPMENT

- A. Prior to inspection, verify that equipment is tested, operational, clean, and ready for operation.
- B. Assist Architect with review. Prepare list of items to be completed and corrected.

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SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.

1.2 INFORMATION ONLY SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file.
- B. Startup construction schedule.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Special Reports: Submit at time of unusual event.

1.3 COORDINATION

- A. Coordinate Contractor's construction schedule with the drawings, schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early or late completion date, unless specifically authorized by Change Order.

- B. Activities: Outline a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define duration anticipated for each activity, unless specifically defined in the drawings or Project Manual.
 2. Procurement Activities: Include procurement process activities for the 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.
 3. Submittal Review Time: Include review and resubmittal times as outlined in Division 01. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's and Project Manager's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Allow time for completion of punch list items and final completion.
- C. 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.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion:
1. All preliminary work completed leading up to System switch over "Weekend".
- E. Recovery Schedule: When periodic update indicates the Work is behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished. Changes to working hours and working days shall be approved in writing by the Owner and/or Engineer prior to implementation by the Contractor.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 15 days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information 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 three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- C. General: Prepare network diagrams using AON (activity-on-node) format.

2.3 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, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (see 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 or 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. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 3 days 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 final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Project Manager, separate contractors, testing and inspecting agencies, and other parties identified for coordination 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

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's Project Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Information Only Submittals: Written and graphic information and physical samples that do not require Engineer's and Project Manager'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. 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.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows:
 - 1. Time for review shall commence on Engineer's receipt of submittal.
 - 2. 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.
 - 3. Initial Review: Allow 7 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer

will advise Contractor when a submittal being processed must be delayed for coordination.

4. Resubmittal Review: Allow 7 calendar days for review of each resubmittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Contractor shall generate a separate email for each submittal. Each email shall contain only 1 pdf document.
2. 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.
3. Name file with submittal number or other unique identifier, including revision identifier.
4. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
5. Transmittal Form for Electronic Submittals shall contain the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer and Project Manager.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Related physical samples submitted directly.
 - j. Indication of full or partial submittal.

E. Paper and/or Material Submittals:

1. 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.
2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
3. Transmittal Form for Paper/Material Submittals shall contain the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer and Project Manager.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.

- h. Submittal purpose and description.
 - i. Related physical samples submitted directly.
 - j. Indication of full or partial submittal.
- F. Options: Identify options requiring selection by Engineer.
- G. Deviations and Additional Information: Contractor shall provide, in writing, a record of relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- I. Distribution: Contractor shall furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

PART 2 - PRODUCTS

2.1 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.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Engineer, will return review comments as an electronic Project record document file.
 - b. Product samples shall be delivered directly to the Engineer's mailing address.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

- a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. 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.
 3. Submit Shop Drawings as a PDF electronic file.
- C. 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.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
- D. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- E. 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.
- F. 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.
- G. 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.

- H. 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.
- I. 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.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Information Only 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 Engineer and Project Manager.
- B. 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.

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SECTION 01 40 00
QUALITY REQUIREMENTS

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 quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Sections:
 - 1. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

- B. Qualification Data: For Contractor's quality-control personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- C. Project quality-control manager may also serve as Project superintendent.
- D. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- E. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
- F. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

- G. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect

installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 3. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 4. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

5. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 6. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 7. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency/special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency/special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 - Execution.
- B. Protect construction exposed by or for quality-control service activities.
1. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

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SECTION 01 41 00
REGULATORY REQUIREMENTS

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. Regulatory requirements applicable to this project are the following (most recent edition adopted by Authority Having Jurisdiction, Including all applicable Amendments and Supplements):
 - 1. 29 CFR 1910 -Occupational Safety and Health Standards; as a work place.
 - 2. ICC (IFC) -ICC International Fire Code.
 - 3. ICC (IBC) -ICC International Building Code.
 - 4. ICC (IPC) -ICC International Plumbing Code.
 - 5. ICC (IMC) -ICC International Mechanical Code.
 - 6. ICC (IFGC) -ICC International Fuel Gas Code.
 - 7. ICC (IECC) -ICC International Energy Conservation Code.
 - 8. NFPA 101 -Life Safety Code.
 - 9. NFPA 70 -National Electrical Code.

1.3 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements.

1.4 QUALITY ASSURANCE

- A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Oklahoma.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 42 00
REFERENCES

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 supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

1.3 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909)	472-4100
ICC	International Code Council www.iccsafe.org	(888)	422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) (562)	423-6587 699-0543

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202)	761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) (301)	638-2772 504-7923
DOC	Department of Commerce www.commerce.gov	(202)	482-2000
DOD	Department of Defense http://dodssp.daps.dla.mil	(215)	697-6257

DOE	Department of Energy www.energy.gov	(202)	586-9220
EPA	Environmental Protection Agency www.epa.gov	(202)	272-0167
FAA	Federal Aviation Administration www.faa.gov	(866)	835-5322
FCC	Federal Communications Commission www.fcc.gov	(888)	225-5322
FDA	Food and Drug Administration www.fda.gov	(888)	463-6332
GSA	General Services Administration www.gsa.gov	(800)	488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202)	708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510)	486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)		
NIST	National Institute of Standards and Technology www.nist.gov	(301)	975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) (202)	321-6742 693-1999
PBS	Public Buildings Service (See GSA)		
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202)	690-7694
RUS	Rural Utilities Service (See USDA)	(202)	720-9540
SD	State Department www.state.gov	(202)	647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202)	334-2934
USDA	Department of Agriculture www.usda.gov	(202)	720-2791
USP	U.S. Pharmacopeia www.usp.org	(800)	227-8772
USPS	Postal Service www.usps.com	(202)	268-2000

- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800)	872-2253
	Architectural Barriers Act (ABA)	(202)	272-0080
	Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov		

CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil Available from Defense Standardization Program www.dsp.dla.mil Available from General Services Administration www.gsa.gov Available from National Institute of Building Sciences www.wbdg.org/ccb	(215) 697-2664 (202) 619-8925 (202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ODEQ	Oklahoma Department of Environmental Quality http://www.deq.state.ok.us/	(405) 702-0100
ODOC	Oklahoma Department of Corrections http://doc.ok.gov/	(405) 425-2500
ODOT	Oklahoma Department of Transportation https://ok.gov/odot/	
OMES	Oklahoma office of management and Enterprise Services https://www.ok.gov/OSF/	(405) 521-2141
OSBI	Oklahoma State Bureau of Investigation https://www.ok.gov/osbi/	(405) 848-6724
OSDE	Oklahoma State Department of Education http://www.sde.ok.gov/sde/	(405) 521-3301
OSDH	Oklahoma State Department of Health https://www.ok.gov/health/	(405) 271-5600
OUBCC	Oklahoma Uniform Building Code Commission https://www.ok.gov/oubcc/	(405) 521-6501

1.6 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

- A. The Owner's Testing Laboratory: An independent testing laboratory will sample and test materials as they are being installed for compliance with acceptance criteria as specified and report and interpret the results. The laboratory shall monitor and report on the installation of constructed work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work. The owner shall be responsible for paying the testing laboratory for these services.
- B. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

1.3 RELATED REQUIREMENTS

- A. Section 01 25 00 - Submittal Procedures.
- B. Section 01 40 00 - Quality Requirements.
- C. Section 01 42 00 - References.
- D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.4 DEFINITIONS

- A. Code or Building Code: current adopted Edition of the International Building Code and, more specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.5 REFERENCE STANDARDS

(Current Edition when furnishing Inspections or conducting Tests)

- A. ACI 318 -Building Code Requirements for Structural Concrete and Commentary.
- B. ACI 530/530.1/ERTA -Building Code Requirements and Specification for Masonry Structures and Related Commentaries.
- C. AISC 360 -Specification for Structural Steel Buildings.
- D. ASTM C31/C31M -Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- E. ASTM C172/C172M -Standard Practice for Sampling Freshly Mixed Concrete.
- F. ASTM D3740 -Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- G. ASTM E543 -Standard Specification for Agencies Performing Nondestructive Testing.
- H. ASTM E2570 -Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage.
- I. AWS D1.1/D1.1M -Structural Welding Code - Steel.
- J. AWS D1.3 -Structural Welding Code - Sheet Steel.
- K. AWS D1.4/D1.4M -Structural Welding Code - Reinforcing Steel.

1.6 SPECIAL INSPECTIONS

- A. The Owner's Testing Laboratory or a separate agency shall serve as a Special Inspector to provide Special Inspection services for the items listed below. The scope of such services for each item shall be as defined in the Building Code or as defined in the local building code of the jurisdiction wherein the project is located. These inspections are mandatory for conformance to the legal requirements of the building code and shall be in addition to the inspections and tests otherwise defined in this specification.
 - 1. Reinforcing Steel Placement
 - 2. Concrete Work
 - 3. Welding of Reinforcing Steel
 - 4. Bolts to be Installed in Concrete and Their Installation to allow for higher allowable tension values
 - 5. Prestressing Tendons Placement
 - 6. Prestressing Operation
 - 7. Grouting of Bonded Prestressing Tendons
 - 8. Precast Concrete Erection
 - 9. Inspection of Structural Steel, Bolting, and Welding Material
 - 10. Welding of Structural Steel
 - 11. High-Strength Bolting
 - 12. Compacted Earth Fill

13. Pile Foundations
 14. Pier Foundations
 15. Shotcrete Work
 16. Masonry Work
 17. Wood Construction
- B. Qualifications of Special Inspector: The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.
- C. Duties and Responsibilities of the Special Inspector:
1. The special inspector shall observe the work assigned to ascertain that, to the best of his/her knowledge, it is in conformance with the approved design drawings and specifications.
 2. The special inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.
 3. The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.

1.7 QUALIFICATIONS OF TESTING LABORATORY

- A. The Testing Laboratory shall meet the basic requirements of ASTM E329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
- B. The Testing Laboratory shall be an Approved Agency by the Building Official of the city wherein the project is located to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
- C. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
- D. Qualifications of Welding Inspectors
1. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section
 2. 6.1.4. Welding inspection shall be supervised and the inspection reports signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI)
 3. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, RT) shall meet the requirements of AWS D1.1, Section 6.14.6.

- E. Qualifications for Post-Tensioning Inspector - The technician for the Owner's Testing Laboratory performing the field inspections required for post-tensioned concrete shall possess a currently valid Level
 - 1. Post-Tensioning Inspector Certification issued by the Post-Tensioning Institute. A copy of such certification for each such technician shall be submitted for Engineer review and approval.

1.8 AUTHORITIES AND DUTIES OF THE LABORATORY

- A. The Owner's Testing Laboratory shall receive from the Owner and review the project plans and specifications with the Architect and Engineer immediately upon receipt and prior to the start of construction. The Laboratory may attend preconstruction conferences with the Architect, Engineer, Project Manager, Contractor, and Material Suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such conferences throughout the course of the project.
- B. Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.
- C. Cooperation with Design Team: The Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
- D. The Laboratory shall perform the required inspections, sampling, and testing of materials as specified under each section and observe methods of construction for compliance with the requirements of the Contract Documents and the applicable building code.
- E. Inspections Required by Government Agencies: The Testing Laboratory shall perform inspections and submit reports and certifications as required by government agencies having jurisdiction over the aspects of the project covered by this specification.
- F. Notification of Deficiencies in the Work: The Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery by telephone or e-mail, and then in writing of observed irregularities and deficiencies of the work and other conditions not in compliance with the requirements of the Contract Documents.
- G. Reports:
 - 1. Information on Reports: The Laboratory shall submit copies of reports of inspections and tests promptly and directly to the parties named below. The reports shall contain at least the following information:
 - a. Project Name
 - b. Date report issued
 - c. Testing Laboratory name and address
 - d. Name and signature of inspector
 - e. Date of inspection and sampling
 - f. Date of test
 - g. Identification of product and Specification section
 - h. Location in the project

- i. Identification of inspection or test
 - j. Record of weather conditions and temperature (if applicable)
 - k. Results of test regarding compliance with Contract Documents
 - 2. Copies: The Laboratory shall send signed copies of test and inspection reports to the following parties:
 - a. Owner or his representative
 - b. Contractor
 - c. Architect
 - d. Engineer of responsibility
 - 3. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.
- H. Accounting: The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.
- I. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner, Architect, and Engineer when those submittals are not made in a timely manner.
- J. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the Contractor and his Subcontractors.
- 1.9 CONTRACTOR'S RESPONSIBILITY
- A. Cooperation with Design Team: The Contractor shall cooperate with laboratory personnel, provide access to the work, and to manufacturer's operations.
- B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.
- D. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.
- E. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.

- F. Payment for Retesting: The Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Owner's Testing Laboratory as required when initial tests indicate work does not comply with the requirements of the Contract Documents.
- G. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:
1. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.
 2. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
 3. Concrete mix designs as prepared by his concrete supplier.
 4. Site-situated storage boxes for concrete cylinders
 5. Concrete coring, tests of below strength concrete, and load tests, if ordered by the Owner, Architect, or Engineer.
 6. Certification of reinforcing steel and prestressing steel mill order.
 7. Certification of structural steel mill order.
 8. Certification of portland cement, lime, fly ash.
 9. Certification of welders and preparation of Welding Procedure Specifications.
 10. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Owner, Architect or Engineer to establish equality with specified items.
 11. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.
 12. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.
- H. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and Owner's Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.
- I. Tests for Suspected Deficient Work: If in the opinion of the Owner, Architect, or Engineer any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction. The Owner shall pay all costs if the tests prove the questioned work to be satisfactory.

1.10 PAYMENT OF TESTING LABORATORY

- A. The Owner will pay for the initial Laboratory services for testing of materials for compliance with the requirements of the Contract Documents. The Contractor will be liable to the Owner for the cost for testing and retesting of materials that do not comply with the requirements of the Contract Documents and shall furnish and pay for the testing and inspection of other items as specified in these Specifications.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 SCOPE OF WORK

- A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner, Architect, and Engineer.

3.2 EARTHWORK:

- A. Compacted Fill Inspection and Testing:

1. Field Density Testing:

a. Paved Areas and Building Slab Subgrade:

- 1) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
- 2) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.

b. Foundation Wall Backfill: Make at least one field density test for each 200 lineal feet of wall with a minimum of 4 tests for the basement walls around the perimeter of each building and a minimum of one test for every other type of foundation wall on the site. Tests shall be performed in random lifts along each wall.

c. Compacted Fill Beneath Column and Wall Footings and Mat Foundations: Make at least one field density test in each compacted fill layer or lift for each column footing, one for each twenty-five lineal feet of wall and one for each 2500 sq. ft of mat foundation area or fraction thereof.

2. Field Density Tests: Field Density Tests shall be run according to ASTM D2937, or ASTM D2922 as applicable.
3. Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.
4. Additional Testing: If reports by the Laboratory indicate field densities lower than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be liable to the Owner for repayment by the Contractor.

B. Foundation Inspection by the Testing Laboratory:

1. Augercast Piles:

- a. Grout Tests: Make and test one set of 6 2-inch cubes according to the requirements of ASTM C109. Each strength test shall be the average of two 28 day strengths. Test two cubes at 3 days, two at 7 days, and two cubes at 28 days. Make an additional set of three cubes and test them at 90 days if a special pozzolan is used in the grout mix. Make one set of cubes for each day's operation but not less than one set for each 25 cubic yards or one set for each pile cap.

2. Precast Concrete Piles:

- a. Plant Inspection: Inspect forms, placement of reinforcing steel, and strands, placement and finishing of concrete, and tensioning of strands.
- b. Concrete Cylinders: Make and test one set of four cylinders for each 100 cubic yards but not less than one set for each day's operation. Break one cylinder at 7 days and two at 28 days and one at 56 days.

3. Drilled Piers, Underreamed and Spread Footings:

- a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.
- b. Reinforcing Steel: Inspect reinforcing steel for proper number and size of bars and confirm dowel or anchor bolt placement into top of pier.

4. Mat Footings

- a. Concrete Cylinders: Make and test concrete cylinders as specified for Poured-in-Place Concrete.
- b. Reinforcing Steel: Inspect reinforcing steel size, number of bars, and placement and confirm dowel or anchor bolt placement into footing.
- c. Temperature Monitoring: Monitor the temperature of the concrete in the mat at different levels as it cures.

C. Foundation Inspection by the Geotechnical Engineer: The Geotechnical Engineer of Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.

1. Spread (Excavated) and Mat Footing:

- a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

2. Augercast Piles:

- a. Dimensional Verification: Verify placement location, plumbness, diameter and length of piles.
- b. Monitoring Grout Quantity: Record for each pile inspected quantity of grout placed compared to the actual quantity required. Report discrepancies to Engineer.
- c. Continuously monitor the grouting operation to verify that the grout head is maintained at least 5 feet above the injection point.
- d. Grout Level: Continuously monitor and record top of pile elevation as grout sets over a 24 hour period. Immediately report any drop in pile elevation to Engineer.
- e. Report: For each pile installed, prepare and submit a report the lists the following information: pile location, pile number, pile diameter, actual tip elevation, actual top of grout elevation, pile length, theoretical volume of grout, actual volume of grout placed, reinforcing steel size and actual depth actually placed, drilling start and finish time, amount of drop of grout level in the first 24 hours after placing, and a list of any unusual occurrences that may affect pile performance. The report shall include the name of the project, the name of the piling contractor and the name of the drilling superintendent. The report shall be signed by a licensed engineer in the state where the project is located.

3. Precast Concrete Piles:

- a. Blow Counts: Record blow count per foot of penetration for each pile. Report any discrepancies to Engineer.
- b. Splices: Inspect 100% of piles splices for proper type and installation.
- c. Report: For each pile installed, prepare and submit a report that lists the following information: pile location and number, computed pile capacity, type and size of hammer used, type of pile-driving cap used, rate of operation of pile driving equipment, pile size or dimensions, elevation of point, elevation of butt before and after cut-off, ground elevation, continuous record of number of blows for each foot of penetration, splice type and locations along length of pile, any pile deviation from specified tolerances, evidence and measurement of pile heave (if any), evidence of pile relaxation (drop-off in pile capacity with time), evidence of soil freeze (increase in pile capacity with time), retap data if a pile is driven further after initial installation, any unusual occurrences during pile driving and state whether or not the pile is capable of supporting the specified design load. The report shall state the recommended course of action for any damaged or mis-driven piles. The report shall include the name of the project, the name of the piling contractor and the name of the field superintendent. The report shall be signed by a licensed engineer in the state where the project is located.

4. Drilled Piers and Underreamed Footings:

- a. Bearing Elevation: Observe that piers are founded in proper bearing strata as defined in the Geotechnical Report and that bottom of hole is clean and

- properly formed. Recommend appropriate action if specified bearing elevation does not provide proper strength.
- b. Bell and Shaft Sizes: Verify that the shaft and bell diameters are within specified tolerances.
 - c. Shaft Stability: Observe the shaft sides as drilling proceeds and recommend appropriate action if sloughing becomes excessive.
 - d. Concrete Quantities: Record quantity of concrete placed in each pier and compare against theoretical quantity required. Report discrepancies to Engineer.
 - e. Placement Method: Observe that piers are placed by approved methods as defined in the Geotechnical Report and in the specifications. Confirm that casings are being used as recommended in the Geotechnical Report. Confirm that concrete is not being contaminated by soil encroachment into pier.
 - f. Report: For each drilled shaft installed, prepare and submit a report indicating the following information: pier number and location, pier shaft diameter, pier underream diameter (if applicable), bottom elevation, top elevation, pier length, theoretical volume of concrete in pier, estimate of actual volume of concrete placed, reinforcing steel size and depth actually placed, drilling start and finish time, concreting start and finish time, variation from specified tolerances including surveyed location and plumbness, construction method (dry method, casing method, or slurry displacement method), groundwater conditions (rate of water infiltration and depth of water in hole prior to concreting for dry piers; water elevation in hole for wet piers), elevation of top and bottom of any casing left in place, description of temporary or permanent casing (including purpose, diameter, wall thickness and length), description and elevation of any obstructions encountered and whether removal was obtained, description of pier bottom including amount and extent of loose material, method of concrete placement, any difficulties encountered in drilling or concreting operations, and any deviations from specifications. The report shall include the name of the project, the name of the drilling contractor and the name of the field superintendent. The report shall be signed by a licensed engineer in the state where the project is located.
- D. Pile Load Test: The Geotechnical Engineer shall supervise a pile load test(s) as specified on the drawings according to ASTM D1143-74. He shall submit a written report of his findings to the parties listed above and report by telephone or e-mail to the Engineer, the results of the pile load tests. Refer to the Pile Specification for additional requirements of the test.

3.3 REINFORCING STEEL

- A. If reinforcing steel is purchased direct from a United States Mill, Manufacturer's test sheets will be sufficient. Steel supplier shall furnish mill certificate reports.
- B. If steel is from an undetermined origin or manufacturer's test sheets or mill certificate reports are unavailable, perform tension and bending tests on three separate samples of each size of bar for every five tons of each type of steel as specified in the appropriate ASTM Specifications. Contractor shall furnish all material for testing and pay for all such tests.

- C. Mechanical Tension Splices: The Owner's Testing Laboratory shall provide 100% visual inspection of mechanical tension splices on the project. Inspection shall verify compliance with specifications and conformance with the manufacturer's recommendations for installation after consulting with the manufacturer, who is to be present for the first installation of the splice on the project. The Laboratory shall additionally conduct monotonic tension tests in accordance with ASTM A1034 of mechanical tension splices of the type as specified on the structural drawings. It is not necessary that the specimens to be tested are production splices, however, the specimens to be tested shall have been made by the Contractor's personnel under field conditions. The rate of testing shall be as follows:
1. Two specimens for the first 50 splices (or fraction thereof for small jobs) at the beginning of the job. Splices not meeting tension requirements shall be retested at Contractor's expense until all splices meet the tension requirements.
 2. One specimen for every 100 (or fraction thereof) additional splices occurring on the job. Any splices not meeting tension requirements shall be retested at Contractor's expense until all splices have passed the test.
 3. A minimum of one test specimen shall also be selected from transition splices (splices of one bar size to another bar size), if any.
- D. Compression Butt Splices: The Owner's Testing Laboratory shall provide 100% visual inspection of compression butt splices on the job. Inspection shall verify splice conformance with the requirements for end bearing splices as set forth in ACI 318 Building Code Requirements for Reinforced Concrete as well as the manufacturer's instructions.
- E. Reinforcing Steel Field Inspection: The Owner's Testing Laboratory or designated Special Inspector shall inspect 100 % of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
1. Primary and secondary, longitudinal reinforcement has correct size and number in proper layers.
 2. Longitudinal reinforcement has correct length and lap.
 3. Ties and stirrups are of correct size, spacing, and number and have the proper termination-hook geometry.
 4. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
 5. Proper hooks are provided at bar ends as detailed.
 6. Reinforcement is properly supported and braced to formwork to prevent movement during concreting operation.
 7. Reinforcement has proper cover.
 8. Sufficient spacing between reinforcement for concrete placement.
 9. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
 10. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped with a length of one square plus two inches.
 11. Proper Construction/Control/Expansion joint spacing and reinforcement.
 12. Reinforcement around embedded items is erected according to details.
 13. Welded reinforcement has been done according to AWS requirements. Review the Welding Procedure Specification (WPS) submitted by the contractor for any

reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and the AWS.

14. Proper installation of flat-slab shear-head reinforcement

- F. Welded Reinforcing: Continuous inspection of the welding of reinforcing bars to ensure compliance with the requirements of AWS shall be done for the following items:

1. Reinforcing steel resisting flexural and axial forces.
2. Boundary elements of reinforced concrete walls.
3. Shear reinforcement.

3.4 CONCRETE CONTROL AND TESTING

- A. Secure composite samples in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.
- B. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.
- C. Any deviations from the requirements of ASTM Specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.
- D. Concrete Test Cylinders:
 1. Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C31 and tested in accordance with ASTM C39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
 2. Frequency of Testing: Each set of test cylinders shall consist of a minimum of four standard test cylinders. A set of test cylinders shall be made according to the following minimum frequency guidelines:
 - a. One set for each class of concrete taken not less than once a day.
 - b. Mat Foundation: One set for each 250 cubic yards or fraction thereof.
 - c. Piers, Piles, Underreamed Footings: One set for each 100 cubic yards or fraction thereof.
 - d. Pressure-Injected Footings: One set for each 50 cubic yards or fraction thereof.
 - e. Spread Footings: One set for each 100 cubic yards or fraction thereof.
 - f. Pile Caps: One set for each 50 cubic yards or fraction thereof.
 - g. Basement Walls: One set for each 150 cubic yards.
 - h. Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5000 square foot of floor area.
 - i. Columns: One set for each 100 cubic yards or fraction thereof with a minimum of 2 sets per floor.
 - j. Shear Walls: One set for each 50 cubic yards but not less than 2 sets per floor.
 - k. Tilt-wall Panels: One set for every 100 cubic yards or fraction thereof.

- l. All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof.
 - m. No more than one set of cylinders at a time shall be made from any single truck.
 - n. If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
 - o. The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
3. The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
4. Standards for Tests of Concrete:
 - a. Slump Tests: Slump Tests (ASTM C143) shall be made at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within plus or minus 1 inch of the slump noted on the mix design submittal form for that class of concrete.
 - b. Air Entrainment: Air entrainment tests (ASTM C231 or C173, C173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above.
 - c. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C1064) at the same time slump tests are made as cited above.
 - d. Unit Weight Test: ASTM C138
- E. Inspect each batch of concrete, monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing from mixers before mix begins to set and within time limits set forth in ASTM C94.
 1. Monitor addition of water to concrete at job site and length of time concrete is allowed to remain in truck during placement.
 2. Certify each delivery ticket indicating class of concrete delivered, amount of water added and time at which cement and aggregate was discharged into truck, and time at which concrete was discharged from truck.
- F. Should the strength of concrete fall below the minimum, then additional tests, including load tests, may be required. These tests, if required, shall be made at the Contractor's expense and shall be in accordance with ASTM C42 and ACI 318. If tests do not meet the applicable requirements, then the structure, or any part of the structure, shall be removed and replaced at the Contractor's expense.
- G. Test reports shall include but not be limited to the following information: Date of concrete placement, concrete mix identification number or proportions of ingredients, truck ticket number, time test was made, time of batching, location of each placement, slump, unit weight and air content of concrete sampled and date and results of strength test.

- H. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.
- I. Any concrete testing requested by the Contractor for early formwork or shoring removal, etc., shall be at the Contractor's expense.
- J. Furnish a statistical analysis for each class of concrete placed on the project in accordance with ACI 214-77 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
 - 1. Strength tests at 7 days of 2 cylinder averages.
 - 2. Strength tests at 28 days of 2 cylinder averages.
 - 3. 28-day moving average strength tests of last 3 test groups.
 - 4. Standard deviation and coefficient of variation based on 28 day strength tests.
 - 5. Average strength and number of 28 day tests for most recent month.
- K. Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
 - 1. Wrong class of concrete (incorrect mix design number).
 - 2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
 - a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
 - b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91. Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Owner's Testing Laboratory or other duly appointed representative.
 - 3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
 - 4. Air contents outside the limits specified in the mix designs.
 - 5. Slumps outside the limits specified.
 - 6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.
- L. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Owner's Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.5 MORTAR OR GROUT

- A. For every other day of grout placed, strength shall be tested with a set of cubes as follows:
 - 1. A set of cubes shall consist of three cubes to be tested at 7 days, and three cubes to be tested at 28 days.
 - 2. Test cubes shall be made and tested in accordance with ASTM C109, with the exception that the grout should be restrained from expansion by a top plate.

3.6 STRUCTURAL STEEL

- A. Contractor shall provide the Testing Laboratory with names of welder to be employed on work, during fabrication and erection, together with certification that each of these welders has passed qualifications tests within the last year, unless noted otherwise, in accordance with AWS Standards.
- B. Inspect all structural steel during and after erection for conformance with Contract Documents and Shop Drawings. Any cases of insufficient bracing or guying, or other unsafe conditions shall be immediately called to attention of Contractor and reported to Architect.
 - 1. No burning or other field correction of steel members is permitted without express permission of Owner's representative. Immediately report violations.
 - 2. Shop Inspection:
 - a. Review Shop Drawings and shop procedures with Fabricator's supervisory personnel.
 - b. Request and obtain necessary mill certification of steel and verify proper material throughout the duration of the job, as required.
 - c. Review welding procedures and welder operator qualifications for conformance to the technical requirements of the specifications.
 - d. Check layout and dimensions of jigs and fixtures for multiple fabrications, joint preparation, fit-up, and runout plates.
 - e. Verify welding electrodes to be used and other welding consumables as job progresses.
 - f. Check preheating procedure for uniformity and thoroughness through the full thickness of material.
 - g. Make visual inspection of welding in progress for size, length and quality.
 - h. Check bolted connections as required by the technical requirements of the specifications.
 - i. Perform random dimensional checks of completed members.
 - j. Provide inspection of surface preparation for coating and coating operations.
 - 3. Field inspection:
 - a. Obtain planned erection procedure, and review with Erector's supervisory personnel.
 - b. Check installation of anchor bolts and base plates.
 - c. Verify field welding procedures and welder qualifications to assure conformance with the specifications.

- d. Check steel as received in field for possible shipping damage, workmanship and piece marking.
 - e. Check plumbness, alignment and camber as erection progresses including proper bracing.
 - f. Check joint preparation, fit-up, backing strips and runout plates.
 - g. Check preheating to assure proper temperature, uniformity, and thoroughness through the full material thickness.
 - h. Review welding sequence.
 - i. Visually inspect field welding for size, length, and quality.
4. Inspection of High-Strength Bolted Construction shall be in accordance with the latest edition of AISC Specification for Structural Joints, and as follows:
- a. All high-strength bolted connections shall be visually inspected.
 - b. At least two bolts of every third connection between floor beams and girders shall be checked with a calibrated torque wrench for proper torque.
 - c. At least two bolts of every third connection between girders and columns shall be checked as above.
 - d. All bolts in every connection in the primary exterior framing and braced framing shall be checked as above.
 - e. All bolted connections that fail shall be corrected and all bolts in the connection shall be retested.
 - f. Check calibration of impact wrenches at least twice daily.
5. Inspection of all welds shall be in accordance with the latest edition of the AWS Structural Welding Code.
- a. Visually inspect all welds in accordance with AWS D1.1.
 - b. All penetration column to base plate welds shall be inspected by ultrasonic testing in accordance with ASTM E-164.
 - c. All full penetration welds in moment connections shall be inspected by ultrasonic testing.
6. Inspection of headed stud connector welding shall be in accordance with the latest edition of the AWS Structural Welding Code and as follows:
- a. Visual inspection of all studs shall indicate complete fusion and weld flush or fillet for 100 percent circumference. There will be no indication of lack of infusion or undercut weld.
 - b. A minimum of two (2) shear studs shall be welded at the start of each production period in order to determine proper generator, control unit and stud welder setting. These studs shall be capable of being bent 45 degrees from vertical without weld failure. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud, such stud shall be struck with a hammer and bent 15 degrees off perpendicular to the nearest end of the beam. Studs failing under this test shall be replaced.

3.7 STEEL JOISTS AND JOIST GIRDERS

- A. Testing Laboratory shall inspect the shop fabrication and the field fabrication and erection at all times during the process of the Work. The Testing Laboratory shall inspect all connections of both bolted and welded types.
- B. Testing Laboratory shall inspect the erection of steel joists and joist girders for proper installation. This inspection shall include checking for proper bearing, welding, bolting, and installation of bridging.

3.8 METAL DECK

- A. Testing Laboratory shall perform field inspection of metal deck for proper type, gage, finish, installation and attachment. Testing Laboratory shall provide a written report of their inspection.

3.9 MASONRY

- A. Verification Testing Frequency: Verification of masonry strength (f'm) will be performed at the beginning of masonry construction and during construction for each 5000 square feet of wall area or portion thereof.
- B. Concrete Masonry Unit: For each type of concrete masonry unit indicated, verify compliance with ASTM C90 and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.
- C. Mortar:
 - 1. Throughout construction, verify the proportions of the site-prepared mortar mix comply with the requirements of ASTM C270 for the type specified.
 - 2. Verify the proportions of materials in premixed or preblended mortar comply with the requirements of ASTM C270 for the type specified as delivered to the site.
- D. Grout:
 - 1. Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM C476 for each type of grout used.
 - 2. Verify the proportions of materials in premixed or preblended grout comply with the requirements of ASTM C476 as delivered to the site.
- B. Prism Test Method:
 - 1. Compression Test: For each type of wall construction indicated for testing, test representative masonry prisms by methods of sampling and testing of ASTM C1314, and as follows:
 - a. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.
 - b. For concrete masonry prisms adhere to requirements as specified under preconstruction testing. Build prisms on job using same materials and methods as for wall construction. Store prisms in air at temperature not less than 65°F in a facility supplied by the contractor where they will be

- undisturbed for seven (7) days. After seven (7) days, transport to laboratory in a manner which will not disturb mortar bond.
- c. Cap each prism with suitable material to provide bearing surfaces on each end.
 - 1) Plane within 0.003 inch.
 - 2) Approximately perpendicular to the axis of the prism.
 - d. The preparation of prisms shall be observed by the testing agency that will test the prisms.
- 2. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.
 - 3. Retests: Where prism tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

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 temporary utilities, support facilities, and security and protection facilities.
- B. Related Section:
 - 1. Section 01 11 00 – Summary of Work for limitations on work restrictions and utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Project Manager, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: No Municipal sewer service presented on job site. Provide and pay for portable sewer service for all entities of construction operations.
- C. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- D. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation

Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "Closeout Procedures".
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - a. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter equipped vacuum equipment.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed

construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. Parking: Provide temporary parking areas for construction personnel in accordance with the Owner.
- C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are always legible.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution Requirements" for progress cleaning requirements.
 - 1. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. No smoking: Smoking shall be prohibited throughout the project/construction site. "No Smoking" signs shall be conspicuously posted at all entrances and throughout the site.
 - 2. The Contractor shall designate a Fire Prevention Program Superintendent/ Fire Safety Manager who shall be responsible for all fire safety efforts until completion and acceptance of the Work described in the Contract Documents that include but are not limited to the following:
 - a. Prefire Plans. Develop in cooperation with the local Fire Chief and Fire Code Official. Any changes affecting the utilization of information contained in the plan shall result in notification to the local Fire Chief and Fire Code Official.
 - b. Training. Job site personnel shall be trained in fire safety practices and procedures and the proper use of fire protection equipment, including hand-held fire extinguishers, hose lines, fire alarm and sprinkler systems.
 - c. Fire Protection Devices. Fire protection and detection equipment shall be maintained and serviced.
 - d. Hot Work Operations. Welding, cutting, open torches, torch-applied roof system activities, and other hot work operations shall be conducted under a permit system. A fire watch and fire extinguishers shall be provided.
 - e. Impairment of Fire Protection Systems. Coordinate planned, emergency or accidental impairments of fire protection systems to include tagging of impaired systems and notification of Fire Department, Alarm Company, Building Owner/Operator, and Contractors.
 - f. Temporary Covering of Fire Protection Devices. Coverings placed on or over fire protection devices for protection from damage shall be immediately removed upon the completion of the Work in the room or area in which the devices are installed.
- G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- H. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.

1. Construct dustproof partitions with fire rated gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 - Closeout Procedures.

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SECTION 01 51 00
TEMPORARY UTILITIES

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 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.
 - 1. Heating and cooling during construction
 - 2. Ventilation during construction
 - 3. Temporary water service
 - 4. Temporary sanitary facilities
 - 5. Temporary power and lighting
 - 6. Construction telephone service.

1.3 RELATED REQUIREMENTS

- A. Section 01 11 00 - Summary of the Work: Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls:
 - 1. Temporary telecommunications services for administrative purposes.
 - 2. Temporary sanitary facilities required by law.

1.4 TEMPORARY ELECTRICITY

- A. Cost: By Owner.
- B. Provide power service required from utility source.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- D. Provide main service disconnect and over-current protection at convenient location and meter.
- E. Permanent convenience receptacles may be utilized during construction.
- F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.5 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 5 foot- candles.
- B. Provide and maintain minimum 3 foot-candles lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.

1.6 TEMPORARY HEATING

- A. Cost of Energy: By Owner.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Existing facilities shall not be used.

1.7 TEMPORARY COOLING

- A. Cost of Energy: By Owner.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Existing facilities shall not be used.

1.8 VENTILATION DURING CONSTRUCTION

- A. Ventilation during Construction: Provide and pay for temporary ventilation devices, energy and related service charges.
- B. Use of Permanent Ventilation Systems: The County may use permanent ventilation equipment after completion, testing and inspection of systems and approval by County's Representative and authorities having jurisdiction.
 - 1. Prior to operation of permanent ventilation equipment for ventilation purposes during construction, Contractor shall verify that equipment is lubricated and filters are in place.
 - 2. Contractor shall provide and pay for maintenance and regular replacement of filters and worn or consumed parts of permanent ventilation system using for ventilation during construction.

3. Immediately prior to Contract Completion review, Contractor shall change disposable filters and clean permanent filters of equipment used during construction.
- C. Ventilation Criteria: Ventilate enclosed areas to assist cure of materials, to dissipate humidity and to prevent accumulation of dust, fumes, vapors and gases, as necessary for proper performance of the Work.

1.9 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Owner.
- B. Connect to existing water source.
 1. Locate and connect to existing water source for temporary construction water service, as acceptable to owner and AHJ.
 2. Extend branch piping with outlets located, so that water is available by use of hoses.
 3. Temporary water service piping, valves, fittings and meters shall comply with requirements of the serving water utility and the Plumbing Code (IPC).
 4. All costs to establish temporary construction water system shall be included in the Contract Sum, or if so specified.
 5. Exercise measures to conserve water.

1.10 TEMPORARY SANITARY FACILITIES

- A. Temporary Sanitary Facilities: Provide and maintain adequate temporary sanitary facilities and enclosures for use by construction personnel. Existing sanitary facilities are not available to construction personnel.
 1. Number of temporary toilets shall be suitable for number of workers.
 2. Provide wash-up sink with soap, towels and waste disposal.
- B. Use of Permanent Sanitary Facilities: Do not use permanent sanitary facilities unless approved by Owner's Representative. Immediately prior to Contract Completion review, thoroughly clean and sanitize permanent sanitary facilities used during construction.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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SECTION 01 55 00
VEHICULAR ACCESS AND PARKING

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 SECTION INCLUDES

- A. Access roads.
- B. Parking.
- C. Existing pavements and parking areas.
- D. Permanent pavements and parking facilities.
- E. Maintenance.
- F. Removal, repair.
- G. Mud from site vehicles.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary Construction: Contractor's option.
- B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.2 SIGNS, SIGNALS, AND DEVICES

- A. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- B. Flag Person Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.1 ACCESS ROADS

- A. Use of designated existing on-site streets and driveways for construction traffic is permitted.
- B. Tracked vehicles not allowed on paved areas.
- C. Provide and maintain access to fire hydrants free of obstructions.

3.2 PARKING

- A. Use of designated areas of existing parking facilities by construction personnel is permitted.
- B. Do not allow heavy vehicles or construction equipment in parking areas.
- C. Arrange for temporary parking areas to accommodate use of construction personnel.
- D. When site space is not adequate, provide additional off-site parking.

3.3 NEW PERMANENT PAVEMENTS

- A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.
- B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.4 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.5 FLAG PERSONS

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.6 HAUL ROUTES

- A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.7 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.8 REMOVAL, REPAIR

- A. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.
- B. Repair existing facilities damaged by use, to original condition.
- C. Repair damage caused by installation.

3.9 MUD FROM SITE VEHICLES

- A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

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SECTION 01 60 00
PRODUCT REQUIREMENTS

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 selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 RELATED REQUIREMENTS

- A. Section 01 21 00 - Allowances: for products selected under an allowance.
- B. Section 01 23 00 - Alternates: for products selected under an alternate.
- C. Section 01 25 00 - Substitution Procedures: for requests for substitutions.
- D. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- E. Section 01 42 00 - References: for applicable industry standards for products specified.
- F. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC restricted product categories.

1.4 REFERENCE STANDARDS

- A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.5 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.6 SUBMITTALS

A. Action Submittals

Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Project Manager's Action: If necessary, Project Manager will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Project Manager will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 25 00 - Submittal Procedures.
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 25 00 - Submittal Procedures. Show compliance with requirements.
- C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.7 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. Refer to Divisions 02 through 33. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 - Closeout Procedures.

PART 2 - PRODUCTS

2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

- B. Do not use products having any of the following characteristics unless specifically required or approved by Owner and Architect:
1. Made outside the United States, its territories, Canada, or Mexico.
 2. Made using or containing CFC's or HCFC's.
 3. Made of wood from newly cut old growth timber.

2.3 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

- B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.

- b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Project Manager's sample", provide a product that complies with requirements and matches Project Manager's sample. Project Manager's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 77 00 - Substitution Procedures for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Project Manager from manufacturer's full range" or similar phrase, select a product that complies with requirements. Project Manager will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.4 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Project Manager will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Project Manager may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

2.5 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.1 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.2 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- E. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.3 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

3.4 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, demonstrate operation of each system to Project Manager and Owner.
- B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

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SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

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 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS."

1.3 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.4 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
 - 1. Adhesives, sealants, and sealer coatings.
 - 2. Carpet.
 - 3. Carpet cushion.
 - 4. Carpet tile.
 - 5. Resilient floor coverings.
 - 6. Wood flooring.
 - 7. Paints and coatings.
 - 8. Insulation.
 - 9. Gypsum board.
 - 10. Acoustical ceilings and panels.
 - 11. Cabinet work.
 - 12. Wall coverings.
 - 13. Composite wood and agrifiber products used either alone or as part of another product.
 - 14. Other products when specifically stated in the specifications.
- B. Interior of Building: Anywhere inside the exterior weather barrier.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including fire stopping sealants and duct joint sealers.

1.5 REFERENCE STANDARDS
(Current Edition at Date of Bid)

- A. CRI (GLCC) -Green Label Testing Program -Approved Product Categories for Carpet Cushion; Carpet and Rug Institute.
- B. CRI (GLP) -Green Label Plus Carpet Testing Program -Approved Products; Carpet and Rug Institute.
- C. GreenSeal GS-36 -Commercial Adhesives; Green Seal, Inc.
- D. SCAQMD 1168 -South Coast Air Quality Management District Rule No.1168; www.aqmd.gov.
- E. SCS (CPD)-SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.

1.6 SUBMITTALS

- A. See Section 01 30 00 -Administrative Requirements, for submittal procedures.
- B. Evidence of Compliance: Submit for each different product in each applicable category.
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
- D. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.
- B. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GreenSeal Certification.

- b. Report of laboratory testing performed in accordance with GreenSeal GS-36 requirements.
 - c. Published product data showing compliance with requirements.
- C. Paints and Coatings: Provide products having VOC content as specified in Section 09 90 00.
- D. Carpet and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current Green Label Plus Certification.
 - b. Report of laboratory testing performed in accordance with requirements.
- E. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 68 13.
- F. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Urea Formaldehyde" certification; www.scs-certified.com.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.
- G. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

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SECTION 01 61 20
AMERICAN WITH DISABILITIES ACT (ADA)

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 INTENT

- A. It is the specific intent of this Section of the Specifications to require all materials systems, products and other items to be in full and complete compliance with the ADA.

PART 2 - PRODUCTS

2.1 PRODUCTS, SYSTEMS, MATERIALS, ITEMS

- A. All Products, Systems, Materials or others items incorporated into the Work, to include job-built items, shall be in full and complete compliance with the ADA requirements. This requirement shall not be waived even though any Product, System, Material or other item is not specifically required to comply with ADA requirements in other Sections of these Specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all Products, Systems, Materials and other items in full and complete compliance with ADA requirements.

END OF SECTION

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SECTION 01 61 23
ASBESTOS PROHIBITION

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 COMPLIANCE WITH APPLICABLE LAW

- A. The Contractor shall fully comply with the requirements of Public Law 99-519 the Asbestos Hazard Emergency Response Act of 1986 and the United States Environmental Protection Agency Regulations promulgated October 30, 1987, Federal Register Volume 52, No. 210 as amended or supplemented on the Bid Date.
- B. The Contractor shall enforce compliance with this law and these regulations to all Sub-Contractors, Sub- Subcontractors and Material Suppliers on this Project. Each Subcontract, Sub-Subcontract and Purchase Order applicable to this project shall contain Subparagraph A directly above.

1.3 INTENT

- A. It is the specific intent of this Section of the Specifications to prohibit the use or installation of any product, material, component of any product or material assembled from two or more separate products or materials, or any item into the Work which contains more than one (1) percent asbestos by weight, and, thus, would be classified by Law as an Asbestos Containing Building Material.

PART 2 - PRODUCTS

2.1 ASBESTOS MATERIALS

- A. No asbestos materials or products containing asbestos shall be installed in the project.
- B. If any such material or product is inadvertently installed, it shall be removed and replaced with an approved substitute, at no cost to the Owner.
- C. It shall be the Contractors responsibility to verify that all materials and products used are asbestos-free, regardless of what may be called for in the Contract Documents.
- D. The Contractor shall provide a notarized certificate as required in Section 01 78 00, that these conditions have been met.

PART 3 - PART 3 - EXECUTION

NOT USED

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SECTION 01 61 26
LEAD CONTAMINATION CONTROL ACT

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 COMPLIANCE WITH APPLICABLE LAW AND REGULATION

- A. Fully comply with the requirements of The Lead Contamination Control Act, and other applicable regulations and laws controlling the use of lead in buildings.
- B. The Contractor shall enforce compliance with applicable laws and regulations to all Subcontractors, Sub- subcontractors and Material Suppliers on this Project. Each subcontract, sub-subcontract and purchase order applicable to this Project shall contain Subparagraph A directly above.

1.3 INTENT

- A. It is the specific intent of this Section of the Specification to require the use of lead-free solder for all water distribution systems, to include the internal plumbing of all factory assembled products such as water heaters, drinking fountains, electric water coolers and faucets.

PART 2 - PRODUCTS

2.1 LEAD MATERIALS

- A. No lead materials or products containing lead shall be installed in the project.
- B. If any such material or product is inadvertently installed, it shall be removed and replaced with an approved substitute, at no cost to the Owner.
- C. It shall be the Contractors responsibility to verify that all materials and products used are asbestos-free, regardless of what may be called for in the Contract Documents.
- D. The Contractor shall provide a notarized certificate as required in Section 01 78 00, that these conditions have been met.

PART 3 - EXECUTION

NOT USED

END OF SECTION

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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. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Sections:
 - 1. Section 01 77 00 - Closeout Procedures for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

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 INFORMATIONAL SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Project Manager of locations and details of cutting and await directions from the Project Manager before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 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

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- 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.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. 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: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. 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 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 promptly.
- B. General: Lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish limits on use of Project site.
 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Project Manager when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Project Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 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.
- 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. 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.
- H. 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.
 - 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.
- I. 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.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. 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.
- C. Temporary Support: Provide temporary support of work to be cut.

- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. Do not cut existing reinforcing. X-ray or use another method of locating reinforcing and then adjust the exact location for core-drilling. Verify with Architect the final location of all penetrations to be drilled.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. 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. Preinstallation Conferences: Include Owner's construction personnel at preinstallation 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.

3.8 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.
 - 2. 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 (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- 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.
- 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.
- I. 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.
- J. 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.

3.9 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 1 Section "Quality Requirements."

3.10 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.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

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. Disposing of nonhazardous construction waste.

1.3 RELATED REQUIREMENTS

- A. Section 31 10 00 - Site Clearing: for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.4 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.5 QUALITY ASSURANCE

- A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

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.
 - 1. Comply with operation, termination, and removal requirements in Section 01 50 00 - Temporary Facilities and Controls.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
- C. 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 Section 01 50 00 - Temporary Facilities and Controls for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - 1. Inspect containers and bins for contamination and remove contaminated materials if found.
- B. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- C. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
- D. Store components off the ground and protect from the weather.
- E. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

- A. General: 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 to 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: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

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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. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Substantial Completion procedures.
 2. Final completion procedures.
 3. Warranties.
 4. Final cleaning.
 5. Repair of the Work.
- B. Related Sections:
1. Division 01 Section 01 78 00 - Closeout Submittals for submitting Record Drawings, Record Specifications, and Record Product Data.
 2. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certificates of Release: From authorities having jurisdiction.

1.4 SPECIAL TOOLS AND TEST EQUIPMENT

- A. Special tools: Provide any special tools needed to perform repair and maintenance for each equipment item.
- B. Test Equipment: Provide a detailed list of the test equipment needed to perform repair and maintenance for each equipment item. The list shall contain the special test equipment part number, size, quantity, manufacturer's name and address, and local supplier's name and address.

1.5 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with 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 photographic documentation, 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 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.

1.6 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining 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 video recordings.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Project Manager 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.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization 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
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. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Project Manager for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. 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.

4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- C. 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.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform 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. 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.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Remove labels that are not permanent.

- h. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- i. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

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SECTION 01 78 00
CLOSEOUT SUBMITTALS

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 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.3 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 77 00 - Closeout Procedures: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.4 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Project Manager will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents plus digital copy in PDF format in final form within 10 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 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 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS

NOT USED

PART 3 - PART 3 - EXECUTION

3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to the Contract.
- 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.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first 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 the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.

- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

3.5 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- G. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions arranged by system and 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. Certificates.
 - c. Photocopies of warranties and bonds.

3.6 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11-inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 CLOSEOUT SUBMITTALS

- 1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals in PDF electronic file.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

1.4 COORDINATION

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

- g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner at mutually agreed upon times with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

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SECTION 03 11 00
CONCRETE FORMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The work of this section includes all labor, materials and equipment required to form all cast-in-place concrete shown on the drawings including but not limited to all slabs, joists, beams, columns, walls, stairs, and equipment pads.
- B. Section Includes
 - 1. Formwork for cast-in-place concrete.
 - 2. Openings in formwork for other affected work.
 - 3. Form accessories such as snap ties, bracing, etc.
 - 4. Stripping formwork.

1.3 REFERENCES

(Current Edition at Date of Bid)

- A. ACI 347: Recommended Practice for Concrete Formwork.

1.4 RESPONSIBILITY

- A. The design, construction and safety of all formwork shall be the responsibility of the Contractor. All forms, shores, backshores, falsework, bracing, and other temporary supports shall be engineered to support all loads imposed including the wet weight of concrete, construction equipment, live loads, lateral loads due to wind and wet concrete imbalance. The Contractor shall also be responsible for determining when temporary supports, shores, backshores, and other bracing may be safely removed.

1.5 DEFINITIONS

- A. Shoring: The activity to support formwork.
- B. Re-shoring: The activity to reduce the amount of formwork supporting concrete elements. As concrete sets and strength increases, less need for formwork occurs gradually until concrete becomes free standing.

1.6 DESIGN RESPONSIBILITY

- A. The design of all concrete formwork, formwork removal, shoring, and backshoring requirements shall be performed by a registered professional engineer in the state of Oklahoma and experienced in the design of concrete formwork. The Contractor shall employ the formwork engineer.

1.7 SUBMITTALS

- A. Shop Drawings: Fabrication and erection drawings of forms for specific finished concrete surfaces, as indicated. Show general construction of forms, jointing, special joints or reveals, location and pattern of form tie placement, and other items affecting exposed concrete visibility.
- B. Form Release Agent: Where concrete surfaces are scheduled to receive special finishes or applied coverings which may be affected by agent submit manufacturer's instructions for use of agent.

1.8 QUALITY ASSURANCE

- A. Designer's Qualifications: Structural professional engineer who complies with Oklahoma licensing law, has experience in concrete formwork, and is acceptable to the authority having jurisdiction.
- B. Design Forms:
 - 1. With sufficient strength to maintain finished tolerances indicated in Section 03 35 00, to support loads, pressures, and allowable stresses as outlined in ACI 347 and for design considerations such.
 - 2. As wind loads, allowable stresses, and other applicable requirements of local Laws and Regulations.
 - 3. To permit easy removal.
 - 4. For required finishes.
- C. The design, engineering, and construction of formwork is CONTRACTOR's responsibility.

1.9 JOB CONDITIONS

- A. For reference purposes, establish and maintain sufficient control points and bench marks to check tolerances. Maintain in an undisturbed condition and until final completion and acceptance of Work.
- B. Regardless of tolerances specified, allow no portion of Work to extend beyond legal boundaries.

1.10 FIELD SAMPLES

- A. Prepare field samples and submit per Section 01 33 00.
- B. Construct and erect sample formwork panel for architectural concrete surfaces receiving special treatment or finish as a result of formwork. Formwork to include vertical and horizontal form joints and typical rustication joints when required.
- C. Size panel to indicate special treatment or finish required, including form release agent.
- D. Remove formwork after casting concrete.

1.11 ACCEPTANCE

- A. Secure ENGINEER's inspection of form layout for concrete flat work.

PART 2 - PRODUCTS

2.1 PAN FORMS

- A. Specification: Unless specified otherwise, concrete joist construction shall conform to current version of Manual of Standard Practice, Chapter 10, as published by CRSI.
- B. Material and Pan Type:
 - 1. Material: Pans shall be fabricated either of steel that is free of dents, irregularities, sag and rust or of glass-fiber reinforced plastic that is molded under pressure with matched dies. Pan forms allowing warped surfaces, leakage of concrete at joints, and uneven surfaces beyond tolerance levels will not be acceptable.
 - 2. Subject to pan tolerance and the surface finish required by the surface finish class SF-1.0, pan forms may be either new pans or reconditioned pans at Contractor's option. Forms may be "long forms", "flange forms", "long flange forms", or "adjustable forms" at Contractor's option. Pan splices may be lapped, reinforced butt jointed, or semi-butt jointed (using end caps welded back-to-back with 2" maximum distance between pan ends). The maximum number of joints in any bay shall be four located at approximately the one-fifth points in each bay.
 - 3. New Pans. All pan forms used in areas designated to have surface finish class SF-2.0 shall be new pans either one piece continuous from beam to beam or beam to header ("longforms", "long flange forms", or "adjustable forms") without splices or with reinforced butt joint spliced. "Flange forms" are not acceptable, nor will forms be permitted that are lapped spliced or semi-butt joint spliced (using end caps welded back-to-back). Pans shall meet tolerances and the surface finish required for surface finish class SF-2.0.
 - 4. New Pans. All pan forms used in areas designated to have Surface Finish-3.0 shall be new pans either one piece continuous from beam to beam or beam to header ("longforms", "long flange forms", or "adjustable forms") without splices or reinforced butt joint spliced. "Flange forms" are not acceptable, nor will forms be permitted that are lapped spliced or semi-butt joint spliced (using end caps welded back-to-back). Pans shall meet tolerances and the surface finish required for surface finish class SF-3.0.

The pan form surfaces specified herein are intended to be architecturally

2.2 FORM-FACING MATERIALS

- A. General:
 - 1. Arrange facing material orderly and symmetrical, keeping number of seams to a minimum.
 - 2. Do not use material with raised grain, patches, or other defects which will impair texture of concrete surface.
- B. Smooth-Formed Finished Concrete: Unless otherwise specified, formwork for exposed concrete surfaces as defined by the Surface Finish Class, shall consist of plywood, metal, metal framed plywood, or other acceptable surface. Formwork shall provide a continuous straight and smooth surface conforming to the joint system as specified on the Architect's drawings. Form material shall have sufficient thickness to withstand pressure of concrete without bow or deflection. Plywood shall be exterior grade plywood panels, suitable for

concrete forms, complying with U.S. Product Standard PS-1, each piece bearing a legible inspection trademark, and as follows:

1. Phenolic Surface Film Overlay over Hardwood Face, Class 1 or better.
 2. High Density Overlay (100/30 min. rating) on Hardwood Face, Class 1 or better.
 3. High Density Overlay (100/30 min. rating) on Softwood Face, Class 1 or better.
 4. Medium Density Overlay on Hardwood Face, Class 1 or better, mill-release agent treated and edge sealed.
 5. Medium Density Overlay on Softwood Face, Class 1 or better, mill-release agent treated and edge sealed.
 6. Structural 1, B-B, or better, mill oiled and edged sealed.
 7. "B-B (Concrete Form) Plywood", Class 1, or better, mill-oiled and edge sealed.
- C. Non-specific formed concrete: Unless otherwise specified, the default finish for formed surfaces shall be rough-form finish constructed with plywood, lumber, metal or other acceptable material. Lumber shall be dressed on at least two edges and one side for tight fit. The minimum grade shall be B-C, exterior grade.
- D. Textured-form finished concrete: For exposed surfaces as noted on the drawings provide units of form face design, size, arrangement and configuration that matches Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners. See Architect's drawings, specifications and control sample for special form textured finish concrete.

2.3 CYLINDRICAL COLUMNS AND SUPPORTS

- A. Round section members shall be formed with metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class unless otherwise specified. Units shall have sufficient wall thickness to resist loads imposed by wet concrete without detrimental deformation.

2.4 FORMWORK ACCESSORIES

- A. Form Ties:
1. Use ties constructed so that end fasteners can be removed without spalling concrete faces.
 2. After end fasteners of ties have been removed, embedded portion of ties are to terminate not less than 2 times the diameter or thickness of the fasteners from formed faces of concrete, but in no case greater than 3/4 inch.
 3. When the formed face on concrete is not exposed, form ties may be cut off flush with formed surfaces. Use ties with 3/4-inch diameter cones on both ends or an approved equal for water retaining structures.
 4. Dampproofed Surfaces: Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
 5. Exposed to Weather or Unconditioned Space: Provide removable, glass-fiber-reinforced plastic, stainless steel, or galvanized form ties that will leave no corrodible metal closer than 1 1/2 inches in surfaces that will be exposed to weather or in an unconditioned space in the final structure. The ties shall leave holes no larger than 1 inch in diameter in concrete surfaces when the ends or end-fasteners are removed.
- B. Pre-molded Expansion Joint Filler: Unless indicated otherwise, Preformed asphalt impregnated fiber, ASTM D1751, 1/2 inch thick.

- C. Form Release Agent: Commercial formulation that will not bond with, stain, nor adversely affect concrete surfaces or impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede curing with water or curing compounds. Provide a product that has a maximum VOC (Volatile Organic Compounds) of 50 g/l but not greater than that permitted by the local government agency having jurisdiction in the area where the project is located. To prevent contamination, agents used on potable water structures are subject to review by ENGINEER prior to use.
- Products: Subject to compliance with requirements, provide one of the following:
1. "Bio-Release EF", Dayton Superior
 2. "Farm Fresh", Unitex
 3. "Form-Eze Natural", The Euclid Chemical Company, Inc.
 4. "Bio-Form", Universal Form Clamp
 5. "Aqua Blue", US Spec
- D. NAILS AND FASTENERS
1. Use only galvanized nails and fasteners for securing formwork in structures exposed to weather or unconditioned spaces such as garages, canopies and porte-cocheres.
 2. Fillets for Chamfered Corners: Wood, Metal, PVC or Rubber strips 1 inch x 1 inch size, maximum length possible.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 FORM CONSTRUCTION

- A. All designs for forms must:
1. Have the strength to withstand the pressure resulting from the placement of concrete and construction loads while maintaining the specified tolerances.
 2. Design forms to withstand support loads, lateral pressure, and allowable stresses outlined in ACI 347. Design for wind, allowable stresses, and other applicable requirements.
- B. Form Materials:
1. Smooth Forms: Use of smooth-faced panel type material of sufficient strength to provide continuous, straight, smooth as-cast surfaces.
 2. Architectural Concrete: Use of 3/4" min. "MDO" or "HDO" plywood.
 3. Embedded for accessories: Use of commercially manufactured items only.
 4. Form Ties: Use of Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent deflection and spalling of concrete surfaces upon removal only.
- C. Form Construction:
1. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

2. Construction is in accordance with ACI 347, to exact sizes, shapes, lines, and dimensions shown.
 3. Shoring and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations.
 4. Support of form facing materials by structural members spaced sufficiently close to prevent upward or lateral deflection during and after concrete placement.
 5. Camber in the formwork as required for anticipated deflections is acceptable when specified.
 6. At construction joints, overlap of forms over hardened concrete at least six inches.
- D. Earth Forms: Side forms of footings may be omitted and concrete placed directly against excavation upon approval from architect only. When earth forms are used, provide one inch minimum additional concrete on each side of the minimum design footing width.
- E. Make forms sufficiently tight to prevent loss of concrete.
- F. Unless indicated otherwise, place chamfer strips in corners of forms to produce beveled edges on permanently exposed exterior corners.
- G. To maintain specified finish tolerances, camber formwork to compensate for anticipated deflections.
- H. Provide positive means of adjustment using wedges, jacks, Shores, and struts to take up all settlement during concrete placing operation.
- I. Provide temporary ports in formwork to facilitate cleaning and Inspection. Locate openings at bottom of forms to allow flushing water to drain.
- J. At construction joints, overlap forms over hardened concrete at least 6 inches. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain true surface.
- K. Construct wood forms for wall openings to facilitate loosening, or counteract swelling.
- L. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.
- M. Anchor formwork to Shores, supporting surfaces or members to prevent upward or lateral movement and deflection of any part of formwork system during concrete placement.
- N. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing.
- O. Position expansion joint material and other embedded items accurately and support to prevent displacement.
- P. To prevent entry of concrete, fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material.
- Q. For architectural concrete, limit deflection of facing materials between studs as well as deflection of studs and walers to 0.0025 times span

- R. For underground concrete work, do not use soil walls for forming unless authorized by ENGINEER.

3.3 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings for elements embedded in or passing through concrete.
- B. Coordinate work of other sections for the forming and setting of openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install accessories per manufacturer's instructions. Ensure items are not disturbed during concrete placement.

3.4 FORM FINISHES

- A. Use forms with smooth rubbed, scrubbed, sand floated finishes that meet ACI 347 unless indicated otherwise.
- B. For As-cast Finishes:
 - 1. Install form panels in orderly arrangement with joints planned in approved relation to building elements.
 - 2. Where panel joints are recessed or otherwise emphasized, locate form ties within joints, not within panel areas
 - 3. Where an as-cast finish is required, no grouting will be permitted in the finishing operation.
- C. Textured Finishes: As indicated.

3.5 APPLICATION OF FORM RELEASE AGENT

- A. Apply form release agent on formwork per manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
- B. Form coatings: Coating of forms is to occur prior to placement of reinforcing steel. Excess form coating material does not accumulate in forms or come into contact with surfaces which will be bonded to fresh concrete.

3.6 FORM REMOVAL

- A. Removal of forms: Formwork not supporting concrete may be removed after curing for 24 hours at temperatures not less than 50 F unless removal is contingent upon concrete strength. Where a specified strength is required prior to removing forms, forms shall be removed when specified parameters have been satisfied.
- B. Do not pry against face of concrete. Use only wooden wedges.
- C. When repair of surface defects or finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations.
- D. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Perform needed repairs or treatment required on such sloping surfaces at once, followed by specified curing.

- E. Loosen wood forms for wall openings as soon as it can be accomplished without damage to concrete.
- F. Formwork for columns, walls, sides of beams, and other members not supporting the weight of concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal.
- G. Where no Re-shoring is planned, leave forms and Shoring used to support weight of concrete in beams, slabs, and other concrete members in place until concrete has attained its specified strength.
- H. Where Re-shoring is planned, supporting formwork may be removed when concrete has reached 70 percent of specified strength, provided Re-shoring is installed immediately.
- I. When Shores and other vertical supports are so arranged that non-load carrying, form-facing material may be removed without loosening or disturbing Shores and supports, facing material may be removed at an earlier age as directed.

3.7 RESHORING

- A. When Re-shoring is permitted or required, plan operations in advance and obtain approval.
- B. During Re-shoring do not subject concrete in beam, slab, column, or any other structural member to combined dead and construction loads and live loads in excess of loads permitted for developed concrete strength at time of Re-shoring.
- C. Placing Re-shores as soon as practical after stripping operations are complete, but in no case later than end of working day on which stripping occurs.
- D. Tighten Re-shores to carry required loads without over-stressing.
- E. Leave Re-shores in place until the concrete being supported has reached its specified strength.
- F. For floors supporting Shores under newly placed concrete, level original supporting Shore or Re-shore.
 - 1. Re-shoring system shall have a capacity to resist anticipated loads in all cases equal to at least 1/2 the capacity of the Shoring system.
 - 2. Unless otherwise specified locate Re-shores directly under a Shore.
 - 3. In multistory buildings, extend Re-shoring through a sufficient number of stories to distribute the height of newly placed concrete, forms, and construction live loads in such a manner that design loads of floors and supporting Shores are not exceeded.
- G. Design, engineering, and construction of Shoring and Re-shoring is the responsibility of the CONTRACTOR.

3.8 REMOVAL STRENGTH

- A. When removal of formwork or Re-shoring is based on concrete reaching a specified strength, it shall be assumed that concrete has reached this strength when either of the following conditions has been met:
 - 1. When test cylinders, field cured along with the concrete they represent, have reached the specified strength.
 - 2. When concrete has been cured per Section 03 39 00 for the same length of time as the site-cured cylinders that reached specified strength. Determine the length of time the concrete has been cured in the structure by cumulative number of days or fractions thereof, not necessarily consecutive, during which the air temperature is above 50 deg. F. and concrete has been damp or sealed from evaporation and loss of moisture.

3.9 REUSE OF FORMS

- A. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of concrete surface.
- B. Thoroughly clean and properly coat forms before reuse.

3.10 FIELD QUALITY CONTROL

- A. Before commencing a pour, verify connections, form alignment, ties, inserts and Shoring are placed and secure.
- B. Observe formwork continuously while concrete is being placed to verify that the forms are plumb and there are no deviations from desired elevation, alignment, or camber.
- C. If during construction any weakness develops and false-work shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen false-work

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SECTION 03 20 00
CONCRETE REINFORCING

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 work of this section.

1.2 DESCRIPTION OF WORK

- A. The work of this section includes labor, materials, hardware, equipment, transportation and services required to fabricate and place all reinforcement for cast-in-place concrete including bars, welded wire fabric, ties and supports shown on the drawings and as specified.
- B. Section Includes:
 - 1. Reinforcing steel bars, wire fabric or rod mats for cast-in-place concrete.
 - 2. Support chairs, bolsters, bar supports, and spacers for supporting reinforcement.

1.3 REFERENCES

(Current Edition at Date of Bid)

- A. AASHTO M 254: Standard Specification for Corrosion Resistant Coated Dowel Bars.
- B. ACI 117: Specification for Tolerances for Concrete Construction and Materials.
- C. ACI 301: Specifications for Structural Concrete.
- D. ACI 315R: Guide to Presenting Reinforcing Steel Design Details.
- E. ACI 421.1R: Guide for Shear Reinforcement for Slabs.
- F. ASTM A 36: Standard Specification for Carbon Structural Steel.
- G. ASTM A 416: Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete.
- H. ASTM A 576: Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
- I. ASTM A 615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- J. ASTM A 706: Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
- K. ASTM A 722: Standard Specification for High-Strength Steel Bars for Prestressed Concrete.

- L. ASTM A 767: Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- M. ASTM A 775: Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- N. ASTM A 884: Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
- O. ASTM A 934: Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
- P. ASTM A 1035: Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement.
- Q. ASTM A 1044: Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete.
- R. ASTM A 1064: Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- S. ASTM C 1116: Standard Specification for Fiber-Reinforced Concrete.
- T. ASTM C 1609 Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)
- U. ASTM D 3963: Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
- V. AWS D1.1: Structural Welding Code - Steel.
- W. AWS D1.4: Structural Welding Code - Steel Reinforcing Bars.
- X. CRSI Document: Manual of Standard Practice.

1.4 SUBMITTALS

- A. Manufacturer's Certificate: Submit mill test certificates of supplied concrete reinforcement, indicating physical and chemical analysis.
- B. Welder's certification.
 - 1. Indicate sizes, spacing, locations, and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting, and spacing devices.
 - 2. When required, prepare shop drawings by an engineer who complies with Oklahoma licensing law and is acceptable to agency having jurisdiction.
- C. Shop Drawings: Comply with requirements of ACI 315R. Include bar schedules, shapes of bent bars, spacing of bars and locations of splices.

1.5 QUALITY ASSURANCE

- A. The Contractor is responsible for management of quality control on the project, including verification of the compliance of the workmanship and materials furnished by his subcontractors and suppliers.
- B. Perform concrete reinforcement work per CRSI Manual of Standard Practice.
- C. Comply with ACI 117 AND ACI 301.
- D. Welders: Certified to comply with AWS D1.1 or AWS D1.4 as applicable.

1.6 ACCEPTANCE

- A. Unless specified otherwise, chairs for supporting reinforcement in flat slabs are spaced as follows.
- B. 3 feet maximum for No. 5 and smaller bars.
- C. 5 feet maximum for bars larger than No. 5.
- D. Dowels are placed on dowel baskets and properly aligned.
- E. Epoxy and galvanized coatings are not chipped or cut. Ends of cut bars are epoxy coated or galvanize painted prior to placement.
- F. Minimum covering over reinforcement is as specified.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcement:
 - 1. Reinforcing materials shall be delivered from the mill in bundles that are identified as to heat number and manufacturer and accompanied with mill and analysis test reports and an affidavit from the fabricator/supplier stating that the material conforms to the requirements of the governing ASTM specification listed herein.
 - 2. Deformed bar material that is not identifiable according to the criteria listed above shall be tested for tensile strength and bend tests according to ASTM A 615 on a sample of 2 bars for each ten tons or fraction thereof of unidentified material for each bar size. The bars shall be a minimum of 24 inches long. Bend tests are not required for #14 and # 18 bars. Fabricator/supplier shall submit the results of such tests for record.
 - 3. Reinforcing Bars: Reinforcing bars shall conform to ASTM A 615, Grade 75 as noted on the drawings.
 - 4. Reinforcing Bars: Reinforcing bars shall conform to ASTM A 615 Grade 60 as noted on the drawings.
 - 5. Special Requirements for Grade 60 Reinforcing Bars: ASTM A 615 Grade 60 Reinforcing bars used as longitudinal reinforcing in locations as noted on the drawings shall additionally comply with the following requirements.

- a. The actual yield strength based on mill tests shall not exceed the nominal yield strength f_y by more than 18,000 psi.
 - b. The ratio of the actual tensile strength to the actual yield strength is not less than 1.25.
6. Reinforcing Bars: Reinforcing bars used as longitudinal reinforcing in locations as noted on the drawings shall conform to ASTM A 706.
7. Reinforcing Steel: Reinforcing steel used as transverse reinforcing or as spiral reinforcing as noted on the drawings shall conform to ASTM A 1035.
8. Weldable Reinforcing Bars: All reinforcing bars noted on the drawings as being required to be welded shall conform to ASTM A 706.
9. Galvanized Reinforcing Steel: Provide galvanized reinforcing bars at the locations indicated on the drawings. Galvanized reinforcing bars shall conform to ASTM A 767 Class II (2.0 oz. zinc PSF), hot dipped galvanized after fabrication and bending. Bars that are to be galvanized shall conform to the type of steel required for the given situation as noted on the drawings.
10. Epoxy-Coated Reinforcing Steel: Provide epoxy coated reinforcing bars at the locations indicated on the drawings. Epoxy coated reinforcing bars shall conform to ASTM A 775. Bars that are to be epoxy coated shall conform to the type of steel required for the given situation as noted on the drawings.
11. Epoxy-Coated Fabricated Reinforcing Steel: Provide reinforcing bars that are epoxy-coated after fabrication at the locations indicated on the drawings. Reinforcing bars that are epoxy-coated after fabrication shall conform to ASTM A 934. Bars that are to be epoxy-coated shall conform to the type of steel required for the given situation as noted on the drawings.
12. Use Reinforcing steel made from 90% recycled material, 2/3 of which shall be post-consumer material. A minimum of 50% of the material in the reinforcement must have been extracted, harvested, or recovered as well as manufactured, within 500 miles of the project site.
13. Plain Steel Welded Wire Reinforcement: ASTM A 1064 with a yield strength of 65,000 PSI. Provide in flat sheets only.
14. Deformed-Steel Welded Wire Reinforcement: ASTM A 1064 with a yield strength of 70,000 PSI. Provide in flat sheets only.
15. Galvanized Plain-Steel Welded Wire Reinforcement: ASTM A 1064, fabricated from galvanized steel wire into flat sheets.
16. Epoxy Coated Plain-Steel Welded Wire Reinforcement: ASTM A 884, Class A, plain steel.
17. Epoxy Coated Deformed-Steel Welded Wire Reinforcement: ASTM A 884, Class A, deformed steel.
18. Strands: Uncoated seven wire, one half inch diameter, stress relieved 270 ksi strand low relaxation type, ASTM A 416 and "Specification for Unbonded Single Strand Tendons" as published by the Post-Tensioning Institute.
19. Prestressing Bars: All prestressing bars shall be deformed threadbars conforming to ASTM A 722 with a minimum ultimate tensile strength of 150 KSI and other properties as specified on page 11-21 of the PCI Design Handbook, fifth edition. Threadbars, plate anchorages and couplings shall be furnished by Dywidag Systems International or Williams unless approved otherwise in writing by the Engineer.
20. Wire: Smooth wire for spiral reinforcement shall conform to ASTM A 1064 with a minimum yield strength of 70,000 PSI.
21. Epoxy-Coated Plain-Steel Wire: ASTM A 884, Class A, plain-steel wire.

22. Joint Dowel Bars: Smooth bars used to dowel across slab-on-ground construction joints shall conform to ASTM A 615, Grade 40 or ASTM A 36, plain-steel bars. Cut bars true to length with ends square and free of burrs.
23. Epoxy-Coated Joint Dowel Bars: Smooth epoxy-coated bars used to dowel across slab-on-ground construction joints shall conform to ASTM A 775 with ASTM A 615, Grade 40 or ASTM A 36 plain- steel bars. Cut bars true to length with ends square and free of burrs.
24. Dowel Bar Sleeves: Plastic or gage metal (26 ga. min.) sleeves with an inside diameter of 1/16 inch greater than the dowel bar that it encases, that have the strength, durability, and design to provide free movement of the dowel relative to the concrete slab and that are specifically manufactured for this purpose.
25. Alternate Slab-on-Ground Joint Load Transfer Systems: A system that consists of flat, ASTM A 36 plate that is saw cut into a square or rectangular shape and is embedded into or encased by a plastic sleeve that allows movement in both lateral directions but not in the vertical direction. Acceptable systems are manufactured by PNA Construction Technologies with products known by the names “Diamond Dowel System” and “PD3 Basket” and Greenstreak Group Inc. with products known as “Speed Plate” and “Double-Tapered Basket”.
26. Tie Wire: Tie wire shall be annealed steel tie wire, minimum 16 gauge.
 - a. Tie wire in architecturally exposed concrete shall be plastic coated or stainless steel.
 - b. Tie wire for epoxy-coated reinforcement shall be epoxy-coated.
 - c. Tie wire for galvanized reinforcement shall be galvanized.
27. Headed Steel Stud Punching Shear Reinforcement: Punching shear reinforcement using headed studs welded to flat bars shall be manufactured in conformance with ASTM A 1044 and approved by the ICC Evaluation Service, Inc. as expressed in an ICC Evaluation Report for use as punching shear reinforcement for slabs and footings designed in accordance with ACI 421.1. The following are acceptable products:
 - a. Decon Studrails; Decon.
 - b. Dayton Shear Resistance System (DSR) D-140; Dayton Superior Corporation.
 - c. Suncoast Stud Reinforcement System; Suncoast Post-Tension, Ltd.
28. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations.
 - a. Slabs-on-Ground: Use precast concrete bar supports (dobies) or supports with sand plates or horizontal runners designed for use on ground.
 - b. Spread Footing Bottom Reinforcement: Use precast concrete bar supports (dobies) or chairs designed for soil-supported slabs.
 - c. Mat Foundation: Use precast concrete bar supports (dobies), chairs designed for soil- supported slabs or poured-in-place concrete curbs.
 - d. Exposed to View Concrete: Provide supports with legs which are plastic protected stainless steel protected (CRSI, Class 2).

- e. Support of Epoxy-Coated Reinforcement: Provide epoxy-coated or other dielectric- polymer-coated wire bar supports to support epoxy-coated reinforcement.
- f. Support of Galvanized Reinforcement: When NOT exposed to view, provide galvanized wire bar supports to support galvanized reinforcement. In all exposed to view conditions provide supports with legs which are plastic protected stainless steel protected (CRSI, Class 2).

2.2 SPLICES

- A. End Bearing Compression Splices: Members with end bearing compression splices shall have vertical bars saw cut or otherwise finished for true bearing. Bar ends shall terminate in flat surfaces within 1 1/2 degrees of a right angle to the axis of the bars and shall be fitted within 3 degrees of full bearing after assembly. Splice bars shall be held in concentric contact by a suitable device. The following are acceptable end bearing compression devices:
 - 1. Speed Sleeve; Erico Products, Inc.
 - 2. G-Loc; BarSplice Products, Inc.
 - 3. Or other Engineer-approved product.
- B. Mechanical Tension Splices:
 - 1. Mechanical splices shall conform to Type 1 and Type 2 splices.
 - a. Type 1 splice shall develop 1.25 times the specified yield strength of the splice bar.
 - b. Type 2 splice shall meet the requirements of Type 1 splice and, in addition, develop the full tensile strength of the splice bar.
 - 2. Splices shall be approved by the ICC-Evaluation Service, Inc and shall have the Evaluation Report submitted for Engineer review.
 - 3. The bar ends that are to attach to the splice shall be prepared and installed in accordance with the manufacturer's requirements.
 - 4. The following are acceptable mechanical tension splices (splices qualified for use with grade 75 bars are parenthetically noted):
 - a. BarLock, S-Series; Dayton Superior.
 - b. US/MC-SAE Mechanical Coupler; Dayton/Richmond, Inc.
 - c. DB Grout Sleeve; Dayton/Richmond
 - d. ZAP Screwlok; BarSplice Products, Inc. (qualified for use with grade 75 bars)
 - e. BPI Grip XL System; Barsplice Products, Inc.
 - f. Taper Threaded Grip Twist System; Barsplice Products, Inc.
 - g. Lenton Coupler; Erico Products, Inc. (for grade 75 bars, use only "Standard Coupler")
 - h. NMB Splice Sleeve; Splice Sleeve North America" (qualified for grade 75 #7 bars and higher)
 - i. BarLock, L-Series; Dayton Superior
 - j. Taperlok Couplers; Dayton Superior
 - k. Lenton Interlok; Erico Products, Inc.

1. Griptec; Dextra Manufacturing Co.
 - m. or other Engineer-approved product.
- C. Dowel Bar Replacement: All grade 60 reinforcing steel dowel bars shown on the drawings crossing concrete construction joint surfaces with inserts cast flush against the form and having reinforcing bars connected to the insert in a subsequent concrete pour shall conform to the following:
 1. Splice connection to the insert shall develop the 1.25 times the specified yield strength and the full tensile strength of the spliced bar.
 2. Splices shall be approved by the ICC Evaluation Service, Inc. as expressed in an ICC Evaluation Service Report which shall be submitted for review.
 3. The following are acceptable products (for use only with grade 60 bars):
 - a. Lenton Form Saver; Erico Products, Inc.
 - b. DB-SAE Dowel Bar Splicer; Dayton/Richmond, Inc.
 - c. or other Engineer-approved product.
- D. Hooked Anchorage Replacement: Reinforcing bar terminations shall be manufactured out of ASTM A 576 material and shall develop the full tensile strength of the bar when installed at the manufacturer's recommended depth.
 1. The anchorage shall be approved by the ICC Evaluation Service Inc. as expressed in an ICC Evaluation Service Report which shall be submitted for review.
 2. The following are acceptable products (for use only with grade 60 bars):
 - a. Lenton Terminator; Erico Products, Inc.
 - b. or other Engineer-approved product.

2.3 FABRICATION

- A. Fabricate reinforcement, ACI 315R providing for concrete cover.
- B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.
- C. Weld reinforcing bars; with AWS D1.4.

PART 3 - EXECUTION

3.1 GENERAL

- A. All designs shall be by a Professional Engineer, licensed in the State of Oklahoma, and having experience in steel design. Shop drawing submittals are to include the professional engineer's seal and dated signature.
- B. Shop drawings to be prepared in accordance with ACI 315R.
- C. Mill Certificates: Submit steel producer's certificates of mill analysis including physical and chemical analysis of reinforcing steel.

3.2 FABRICATION AND DELIVERY

- A. Bending and Forming: Fabricate bars of indicated sizes and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do not heat reinforcement for bending. Bars shall be free from injurious defects, have a workman-like finish with no excessive rust and/or pitting and have no unusual kinks or bends.
- B. Marking and Shipping: Bundle reinforcement and tag in accordance with Section 7.4.5 of the CRSI "Manual of Standard Practice". Transport and store at site so as not to damage material. Keep sufficient supply of tested, approved and proper reinforcement at the site to avoid delays. Maintain reinforcing bars free of mud, dirt, grease, or other coating.
- C. Repair of Epoxy-Coated Reinforcing: Repair cut and damaged epoxy coatings on fabricated reinforcing before delivery with epoxy repair coating according to ASTM D 3963

3.3 PLACING REINFORCEMENT

- A. Comply with CRSI recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as herein specified.
- B. Before placing reinforcement and again before concrete is placed, clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by chairs, runners, bolsters, spacers and hangers, as required. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide spreaders and spacers to hold steel in position. Support steel at proper height upon approved chairs.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set tie wires so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Support of Spread Footing Reinforcing Steel
 - 1. Bottom Steel: Support bottom reinforcing mat to provide the specified clearance to the bars. Spacing between supports shall not exceed 4'-0" centers each way.
 - 2. Top Steel: Support top reinforcing on steel angle frames braced in both directions or on special standee support bars. Spacing between supports shall not exceed 4'-0" centers each way. The depth of the supports shall provide the specified clearance from the bars to the top of the concrete. The design of the support steel shall be the responsibility of the Contractor in accordance with Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".

F. Support of Mat Foundation Reinforcing Steel

1. Bottom Steel: Support bottom reinforcing mat to provide the specified clearance to the bars. Spacing between supports shall not exceed 4'-0" centers each way.
2. Top Steel: Support top reinforcing on steel angle frames braced in both directions or on special standee support bars. Spacing between supports shall not exceed 4'-0" centers each way. The depth of the supports shall provide the specified clearance from the bars to the top of the concrete. The design of the support steel shall be the responsibility of the Contractor in accordance with Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".

G. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus two inches and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

H. Coordinate with other trades and expedite materials and labor to avoid omissions and delay.

I. Install waterproof membrane or vapor barrier as specified prior to placing steel for concrete slabs-on- ground.

J. Extend reinforcement continuous through construction joints unless otherwise shown on the drawings.

K. Slab-on-Ground Joint Dowel Bars: Support slab-on-ground joint dowel bars independently of support for slab reinforcement on soil supported slab bolsters or specially manufactured cradles such that dowel bar remains parallel to slab surface and at right angles to joint during concreting operations. Lightly coat the exposed end of the dowel with a paraffin-base lubricant, asphalt emulsion, form oil, or grease or use a dowel bar sleeve.

L. Alternate Slab-on-Ground Joint Load Transfer Systems: Install the alternate load transfer system in accordance with the manufacturer's instructions such that the largest plane of the flat plate is parallel to the plane of the subgrade on which the slab is bearing.

M. Provide and place additional reinforcing steel at all sleeves and openings in beams, slabs and walls as specified on the drawings. Where sleeves or openings not shown on the drawings interrupt the reinforcement, consult with Engineer for instructions for placing and splicing of bars. Provide required additional reinforcing steel at no additional cost to the Owner.

N. Epoxy-Coated Reinforcement: Use epoxy-coated steel tie wires to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963.

O. Galvanized Reinforcement: Use galvanized steel tie wires to fasten galvanized reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

3.4 SPLICING REINFORCING STEEL

A. Provide splice as indicated on the drawings. Splice reinforcing bars only at locations shown on the structural drawings and approved shop drawings. Unauthorized or unscheduled splices not approved by the Engineer in writing will not be accepted.

- B. All lap splices in reinforcing steel shall be contact lap splices unless detailed otherwise on the drawings.
- C. Maintain proper cover between reinforcing bars at splices.
- D. Lap unscheduled reinforcing bars not otherwise specified a minimum of 30 bar diameters at splices. Lap welded wire fabric a minimum of one full wire mesh plus two inches.
- E. Reinforcing Steel Placement in Mat Foundations
 - 1. Size, length, spacing, and location of all mat reinforcing steel is shown on the mat plans and details. See details on the drawings for required stagger pattern of top and bottom bar splices and for sequence of placing mat reinforcing steel layers.
 - 2. The number of splices shall be minimized by using bar runs of 60'-0" as much as possible. Unless noted otherwise, continuous top reinforcing bars shall be spliced along column centerlines. Continuous bottom reinforcing bars shall be spliced mid-way between columns.
 - a. Provide Class B tension lap splices for all bars #11 and smaller. Stagger splices as shown in the typical details.
 - b. Avoid splices of #14 and #18 bars where possible. Where required, a mechanical tension splice as specified shall be provided. No more than 50% of such bars shall be spliced in any 5'-0" width of mat cross-section. Spliced bars shall be staggered with un-spliced bars.
- F. Manufacturer of mechanical tension splice shall be present for first day's installation.

3.5 WELDING REINFORCING STEEL

- A. Welding reinforcing steel is permitted only where specifically shown on the drawings. All welding shall conform to AWS D1.4. Only weldable reinforcing steel conforming to ASTM A 706 or deformed bar anchors conforming to ASTM A 1064 shall be permitted. ASTM A 615 bars may not be welded for structural use.
- B. Tack welding of reinforcement shall only be allowed for preassembled mats and cages.

3.6 SHRINKAGE AND TEMPERATURE REINFORCEMENT

- A. Provide shrinkage and temperature reinforcement as indicated on the drawings or in this spec at right angles to main top and bottom bars for all structural slabs unless detailed otherwise on the drawings.

3.7 PLACEMENT OF WELDED WIRE REINFORCEMENT

- A. Wherever welded wire reinforcement is specified as reinforcement in pan-formed beams or slabs, it shall be continuous and properly lapped one full wire spacing plus 2" across the entire concrete surface and not interrupted by beam or girders.

3.8 REINFORCEMENT IN JOIST DISTRIBUTION RIBS

- A. Provide reinforcement in ribs, minimum one - #5 continuous top and bottom unless indicated otherwise on the drawings.

3.9 REINFORCEMENT IN COMPOSITE METAL DECK SLAB

- A. Composite metal deck slabs shall be reinforced as indicated on the drawings.
- B. Extra Reinforcement Over Girders: Provide additional reinforcing steel over interior girders as shown on the drawings.
- C. Placement of Slab Reinforcement: Provide bolsters, high chairs, and/or additional reinforcing as shown in details on the drawings to support the reinforcing with the clear cover shown on the drawings.

3.10 FIBER-REINFORCED CONCRETE IN TOPPING SLABS, SIDEWALKS, AND DRIVEWAYS

- A. Provide fibers of the type and at the dosage rate shown on the drawings or as follow:
- B. The fiber-reinforced concrete shall be produced in accordance with ASTM C 1116.
- C. The dosage of synthetic fibrillated microfibers shall be 1.5 lb/yd³.
- D. Recommended dosage of synthetic macrofibers shall provide an equivalent flexural strength ratio ($R_{f,150}$ **R^{150} or $R_{e,3}$**) of 20 percent when tested in accordance with ASTM C 1609/C 1609M, but shall not be less than 3 lb/yd³.

3.11 REINFORCEMENT AROUND OPENINGS IN COMPOSITE METAL DECK SLABS

- A. For all openings in metal deck not framed with structural steel and greater than 10" in width in either direction, provide additional reinforcing steel as shown in details on the drawings.

3.12 REINFORCEMENT IN PAN-FORMED BEAM SLABS

- A. Reinforcement: Provide reinforcing in pan-formed beam slabs as shown on the drawings.
- B. Placement of Slab Reinforcement: Provide required bar supports and additional reinforcing as shown in details on the drawings to support slab reinforcing with the clear cover shown on the drawings.

3.13 REINFORCEMENT IN GRADE BEAMS

- A. Provide reinforcing in grade beams as shown on the drawings.
- B. Bar Support for Grade Beam Cages: Grade beam bottom steel shall be supported at 5'-0" maximum centers using beam bolsters that provide 3" bottom cover to the reinforcing steel. Beam bolsters used shall be designed and manufactured for support on soil.

3.14 REINFORCEMENT IN TOPPING SLABS

- A. In addition to fiber reinforcing, provide welded smooth wire reinforcement minimum 6 x 6 W1.4 x W1.4 in all topping slabs unless specified otherwise on the drawings.

3.15 REINFORCEMENT IN HOUSEKEEPING PADS

- A. In addition to fiber reinforcing, provide welded smooth wire reinforcement 6 x 6 W2.9 x W2.9 minimum in all housekeeping pads supporting mechanical equipment unless detailed otherwise on the drawings.

3.16 REINFORCEMENT IN SIDEWALKS

- A. In addition to fiber reinforcing, provide welded smooth wire reinforcement minimum 6 x 6 W1.4 x W1.4 in all sidewalks unless detailed otherwise in the Contract Documents.

3.17 MECHANICAL AND PLUMBING REQUIREMENTS

- A. Refer to Mechanical and Plumbing Drawings for concrete requiring reinforcing steel. Such reinforcement shall be furnished as part of the work of this section.

3.18 QUALITY ASSURANCE TESTING AND INSPECTION DURING CONSTRUCTION

- A. See Testing Laboratory Services section of these Specifications for reinforcing inspection and testing requirements.

END OF SECTION

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SECTION 03 30 00
CAST-IN PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division- 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of concrete work is shown on drawings, including schedules, notes and details which show size and location of members and type of concrete to be placed. Furnish all labor, materials, services, equipment, and hardware required in conjunction with or related to the forming, delivery and placement of all cast-in- place concrete Work.

1.3 SECTION INCLUDES

- A. Material requirements.

1.4 REFERENCES
(Current Edition at Date of Bid)

- A. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
- C. ACI 211.3: Standard Practice for Selecting Proportions for No-Slump Concrete.
- D. ACI 214R: Guide to Evaluation of Strength Test Results of Concrete.
- E. ACI 301: Specifications for Structural Concrete.
- F. ACI 305.1: Specification for Hot Weather Concreting.
- G. ACI 306.1: Standard Specification for Cold Weather Concreting.
- H. ACI 318: Building Code Requirements for Structural Concrete.
- I. ASTM C 33: Standard Specification for Concrete Aggregates.
- J. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- K. ASTM C 88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- L. ASTM C 94: Standard Specification for Ready-Mixed Concrete.

- M. ASTM C 117: Standard Test Method for Material Finer than 75 μ (No. 200) Sieve in Mineral Aggregates by Washing.
- N. ASTM C 138: Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- O. ASTM C 143: Standard Test Method for Slump of Hydraulic-Cement Concrete.
- P. ASTM C 150: Standard Specification for Portland Cement.
- Q. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete.
- R. ASTM C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- S. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete.
- T. ASTM C 295: Standard Guide for Petrographic Examination of Aggregates for Concrete.
- U. ASTM C 441: Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to The Alkali-Silica Reaction.
- V. ASTM C 494: Standard Specification for Chemical Admixtures for Concrete.
- W. ASTM C 595: Standard Specification for Blended Hydraulic Cements.
- X. ASTM C 618: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete. AA. ASTM C 1064: Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
- Y. ASTM C 1077: Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- Z. ASTM C 1116: Standard Specification for Fiber-Reinforced Concrete.
- AA. ASTM C 1157: Standard Performance Specification for Blended Hydraulic Cement.
- BB. ASTM C 1240: Standard Specification for Use of Silica Fume as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout.
- CC. ASTM C 1260: Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method). AG. ASTM C 1293: Standard Test Method for Concrete Aggregates by Determination of Length Change of
- DD. Concrete Due to Alkali-Silica Reaction.
- EE. ASTM C 1567: Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).

- FF. ASTM C 1602: Standard Specification for Mixing Water Used in The Production of Hydraulic Cement Concrete.
- GG. ASTM C 1778: Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete

1.5 SUBMITTALS

- A. Quality Assurance: Submit names, certification levels, and years of experience of testing agency's laboratory and field technicians that are assigned to the Work. Verify laboratory complies with ASTM and ACI standards.
- B. Mix Design: Submit.
 - 1. Date of mix design. If older than 365 days, recertify mix design.
 - 2. Mix design number or code designation by which the Contractor shall order the concrete from the Supplier.
 - 3. Structural slab or member for which the concrete is designed (i.e., columns, shear walls, footings, slab on ground, etc.).
 - 4. Cement source, type and chemical composition.
 - 5. Aggregate soundness and potential reactivity.
 - 6. 28-day compressive strength.
 - 7. Fly ash or other pozzolan type and brand (if any).
 - 8. Admixtures including air entrainers, water reducers, high-range water reducers, accelerators, and retarders.
 - 9. Allowable range of slump and air content.
 - 10. Water-cementitious materials ratio and maximum allowable water content.
 - 11. Proportions of materials in the mix.
 - 12. Wet and Dry unit Density.
 - 13. Analysis of water if water is not potable.
 - 14. Mortar bar test results if a pozzolan is included in the mix.
 - 15. Method by which the concrete is intended to be placed (bucket, chute, or pump).
 - 16. Technical data sheets for additives to be used at the plant and at the job site. Certify additives are compatible with each other.
 - 17. Required average strength qualification calculations per ACI 301. Submit separate qualification calculations for each production facility that will supply concrete to the project.
 - 18. Documentation of Average strength (trial mix data or field test data) per ACI 301: When field test data is used to qualify average strength, submit separate documentation for each production facility that will supply concrete to the project.
 - 19. Field test data submitted for qualification of average strength under ACI 301 shall include copies of the Concrete Testing Laboratory's reports from which the data was compiled.
 - 20. All other information requested in the Concrete Mix Design Submittal Form located at the end of this specification section.
- C. Pre-approved mix design, submit name and address of Supplier.
- D. Before changing mix design, submit a new design and give ENGINEER 10 days to evaluate the changes.

- E. Construction Joints: Submit drawing of proposed construction joint locations in concrete for slab on ground, mat foundations, structural floors, roofs and walls. Submit any additional or changed reinforcing that is required at construction joints that differs from that shown on the drawings.
- F. Placement Sequence for Mat Foundation: Submit proposed placement sequence for mat foundations.
- G. Industrial Slabs: Submit proposed placement sequence and procedure for protecting concrete during placement, finishing, and curing.
- H. Source Quality Control Inspections and Testing Report: If requested, submit report describing CONTRACTOR's and Supplier's quality control activities and test results.

1.6 QUALITY ASSURANCE

- A. The concrete supplier shall have a minimum of five years' experience in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment. The supplier must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- B. The concrete contractor shall have a minimum of five years' experience with installation of concrete similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful –service performance.
- C. Use a laboratory that follows and complies with ASTM C 1077.
- D. Reject concrete that does not meet requirements of this section.
- E. Do not change material sources, type of cement, air-entraining admixture, water reducing admixture, other admixtures except as allowed by mix design.
- F. Store bagged and bulk cement in weatherproof enclosures. Exclude moisture and contaminants.
- G. Prevent segregation and contamination of aggregate stockpiles.
- H. Avoid contamination, evaporation, or damage to admixtures. Protect liquid admixtures from freezing.
- I. Use of admixtures will not relax hot or cold weather placement requirements.

1.7 QUALITY CONTROL

- A. The Contractor is responsible for control of quality, including workmanship and materials furnished by his subcontractors and suppliers.
- B. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 301 – “Specifications for Structural Concrete”.

2. ACI 117 – “Specification for Tolerances for Concrete Construction and Materials.”
 3. ACI 318 – “Building Code Requirements for Structural Concrete”.
 4. Concrete Reinforcing Steel Institute (CRSI), “Manual of Standard Practice”.
 5. Steel Construction Manual, 13th edition, American Institute of Steel Construction
- C. Document Conflict and Precedence: In case of conflict among Contract Documents and Contract Specifications, request clarification from the Architect/Engineer through “Request for Information” (RFI) process before proceeding with the Work. In case of a conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.
- D. Manufacturer Representative Presence:
1. Post-installed anchors: The manufacturer’s representative for each post-installed anchor product (adhesive, expansion, undercut, screw, or insert anchor) shall be present during the first day’s installation of the product to observe whether the anchors are installed according to manufacturer’s instructions.
 2. Fiber-reinforced concrete: The manufacturer’s representative for each fiber type shall be present during the first placement in which the fiber is used to observe whether the dosage rate and placing and finishing method is in accordance with the specifications and the manufacturer’s instruction.

1.8 PROVISION FOR OTHER WORK

- A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking, grounds and other fastening devices required for attachment of work. Properly locate in cooperation with other trades and secure in position before concrete is placed. Do not install sleeves or blockouts in any concrete slabs, beams or columns except where shown on the drawings or upon written approval of the Architect/Engineer.
- B. Protect adjacent finish materials against damage and spatter during concrete placement.
- C. To maintain location accuracy, building control lines and elevation benchmarks shall be furnished for the use of all trades.

1.9 ACCEPTANCE

- A. Materials:
1. At the Source: Verify aggregate gradation. Determine percent of combined aggregate passing No. 200 sieve.
 2. At the Site: Verify mix identification, batch time, slump, air content, density, and temperature.
 3. At the Laboratory: Verify strength in 28 days.
- B. Placement:
1. Concrete in general, Section 03 30 10.
 2. Pavement, Section 32 13 13.

C. Defective Material:

1. Price adjustment, Section 01 22 00.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Refer to the drawings and other related specification sections to determine the necessary concrete classes and strengths, not all materials listed Below are utilized in the project.

B. Hydraulic Cement:

1. Use ASTM C 150, Type I/II or Type III, or ASTM C 1157, Type GU or HE unless otherwise specified. Do not use Type III cement in slabs on ground unless approved in advance by the Architect and Engineer.
2. Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Architect/Engineer and the Owner's Testing Laboratory. Submit mill certificates certifying conformance to this specification for each brand and type of cement. Documentation of design mix strength history must match the cement brand used.
3. Testing of cement in lieu of mill certificate submittal will be required if:
 - a. The cement has been in storage at the mixing site for over 30 days
 - b. It is suspected by the Owner, Architect, Engineer or Testing Laboratory that the cement has been damaged in storage or in transit or is in any way defective.

- C. Low-alkali cement: Cement that has the additional requirement that equivalent alkalis ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) do not exceed 0.60% according to ASTM C 150, Table 2.

- D. Expansive Cement: ASTM C 845, Type K.

E. Supplementary Cementitious Materials (SCM).

1. Fly Ash: ASTM C 618, Class C or F.
2. Silica Fume: ASTM C 1240, Amorphous silica. Products:
 - a. MasterLife SF 100; Master Builders Solutions US LLC.
3. Slag Cement: ASTM C 989, Grade 100 or 120 or ASTM C 595, Type IS or Type S.
4. Metakaolin: ASTM C618, Class N. Products:
 - a. MetaMax; BASF Kaolin (part of BASF Corporation).

- F. Normal weight Aggregates: ASTM C 33, and as herein specified. Submit material certificates from aggregate supplier or test results from an independent testing Laboratory certifying conformance to this specification for each source of aggregate.

- G. Lightweight Aggregates: ASTM C 330. Submit material certificates from aggregate supplier or test results from an independent testing Laboratory certifying conformance to this specification for each source of aggregate.
- H. Water: Comply with the requirements of ASTM C 1602
- I. Cementitious materials, aggregate, and water must be extracted or recovered as well as manufactured within 500 miles of the project site.
- J. For each admixture type listed below, and subject to compliance with requirements, provide one of the products and manufacturers following the admixture type.
- K. For each admixture type listed below, submit manufacturer's certification that the product conforms to the requirements specified and is compatible with all other admixtures to be used.
- L. Air-Entraining Admixture: ASTM C 260.
 - 1. Products:
 - a. Darex or Daravair series; W. R. Grace & Co.
 - b. MasterAir Series; Master Builders Solutions US LLC.
 - c. Sika AER; Sika Corporation.
 - d. Air Mix or AEA-92; the Euclid Chemical Company.
 - e. Eucon Air 30 or Eucon Air 40; the Euclid Chemical Company.
- M. Water-Reducing Admixture: ASTM C 494, Type A.
 - 1. Products:
 - a. MasterPozzolith Series or MasterPolyheed Series; Master Builders Solutions US LLC.
 - b. Plastocrete 161; Sika Chemical Corp.
 - c. Eucon WR-75 or WR-91; The Euclid Chemical Company.
 - d. WRDAseries; W.R. Grace & Co.
 - e. Eucon NW or Eucon LW; The Euclid Chemical Company.
- N. Mid-Range Water-Reducing Admixture: ASTM C 494, Type A and Type F.
 - 1. Products:
 - a. MasterPolyheed Series; Master Builders Solutions US LLC.
 - b. Eucon MR; The Euclid Chemical Company
 - c. Sikament HP; Sika Chemical Corp.
 - d. Daracem or Mira series; W.R. Grace & Co.
 - e. Eucon X15 or Eucon X20; The Euclid Chemical Company.
- O. Retarding Admixture: ASTM C 494, Type B.
 - 1. Products:

- a. MasterSet R Series or MasterSet DELVO Series; Master Builders Solutions US LLC.
- P. Accelerating Admixture (Non-Corrosive, Non-Chloride): ASTM C 494, Type C.
- 1. Products:
 - a. Polarset, Gilco, Lubricon NCA or DCI; W.R. Grace & Co.
 - b. MasterSet AC 534 or MasterSet FP 20; Master Builders Solutions US LLC.
 - c. Accelguard 80/90, NCA or AcN; The Euclid Chemical Company.
 - d. Plastocrete 161FL; Sika Chemical Co.
 - e. Eucon AcN; The Euclid Chemical Company.
- Q. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
- 1. Products:
 - a. Daratard series; W.R. Grace & Co.
 - b. MasterSet R Series or MasterSet DELVO Series; Master Builders Solutions US LLC.
 - c. Plastiment; Sika Chemical Co.
 - d. Eucon Retarder Series; The Euclid Chemical Company.
- R. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
- 1. Products:
 - a. MasterSet FP 20; Master Builders Solutions US LLC.
 - b. Accelguard 80/90, NCA or AcN; The Euclid Chemical Company.
 - c. Plastocrete 161FL; Sika Chemical Co.
 - d. Eucon AcN; The Euclid Chemical Company.
- S. High-Range Water-Reducing Admixture (superplasticizer): ASTM C 494, Type F or Type G.
- 1. Products:
 - a. ADVA or Daracem Series; W.R. Grace & Co.
 - b. MasterRheobuild 1000 or MasterGlenium Series; Master Builders Solutions US LLC.
 - c. Sikament; Sika Chemical Corp.
 - d. Eucon 37/1037 or Plastol series; The Euclid Chemical Company.
 - e. Euconl SP or Eucon RD; The Euclid Chemical Company.
- T. Workability-Retaining Admixture: ASTM C 494, Type S. Shall retain concrete workability without affecting time of setting or early-age strength development.
- 1. Products:
 - a. MasterSure Z 60; Master Builders Solutions US LLC.

- U. Porosity Inhibiting Admixture's (PIA's): ASTM C 494, Type S. Integrally densify & reduces lab permeability without the use of sodium silicates.
 - 1. Products:
 - a. Marrier One PIA; Barrier One Concrete Admixtures.
- V. Viscosity Modifying Admixture: Used to enhance plastic concrete properties such as workability, pumpability, and stability for "self-consolidating concrete".
 - 1. Products:
 - a. MasterMatrix VMA Series; Master Builders Solutions US LLC.
 - b. Eucon SL or Viscrol; The Euclid Chemical Company.
 - c. VisoCrete series; Sika Chemical Co.
 - d. VMAR series; W.R. Grace & Co.
- W. Shrinkage Reducing Admixture: An admixture that reduces drying shrinkage by reducing the capillary tension of pore water. ASTM C 494, Type S.
 - 1. Products:
 - a. For Air-Entrained Concrete:
 - 1) MasterLife SRA Series or MasterLife CRA 007; Master Builders Solutions US LLC. 2). Eclipse Plus; Grace Construction Products.
 - 2) Eucon SRA; The Euclid Chemical Company.
 - b. For Non-Air-Entrained Concrete:
 - 1) Eclipse Floor; Grace Construction Products.
 - 2) MasterLife CRA 007; Master Builders Solutions US LLC.
- X. Corrosion Inhibitor: 30% calcium nitrite. ASTM C 494, Type C.
 - 1. Products: Provide the following at dosage rates per Engineer of Record from manufacturer's recommendation based on design life, application, clear cover and other products in concrete mix:
 - a. Eucon CIA or Eucon BCN; the Euclid Chemical Company.
 - b. DCI or DCI-S; W.R. Grace & Co.
 - c. MasterLife CI 30; Master Builders Solutions US LLC.
 - d. Sika CNI; Sika Chemical Co.
- Y. Corrosion Inhibitor: Amine-Ester type. ASTM C 494, Type S.
 - 1. Products: Provide the following at dosage rates per manufacturer's recommendation:
 - a. MasterLife CI 222; Master Builders Solutions US LLC.

- Z. Alkali-Silica Reaction-Inhibiting Admixture: ASTM C 494, Type S. Shall contain a nominal lithium nitrate content of 30 percent.
1. Products:
 - a. MasterLife ASR 30; Master Builders Solutions US LLC.
- AA. Crystalline-forming Waterproofing Admixture: A powder admixture capable of producing concrete that is water tight under hydrostatic pressure up to 7 atmospheres when tested in accordance with Corps of Engineers test CRD-C48 and capable of sealing cracks up to 0.4mm.
1. Products: Provide the following at dosage rates per manufacturer's recommendation:
 - a. Penetron Admix; ICS/Penetron International/Ltd.
 - b. Krystol Internal Membrane; Kryton International, Inc.
 - c. Xypex C series; Xypex Chemical Corporation.
 - d. MasterLife 300 Series; Master Builders Solutions US LLC.
- BB. Calcium Chloride and Chloride Ion Content: Calcium chloride or admixtures containing intentionally added chlorides are not permitted. For concrete exposed to sulfate exposure class S2 or S3 as noted on the drawings, admixtures must be completely free of chloride ions.
- CC. Certification: Written conformance to all the above-mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of mix design review by the Engineer.

2.2 RELATED MATERIALS

- A. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide type as follow where shown on drawings.
1. ADCOR ES waterstops: W.R. Grace & Co.
 2. Polyvinyl chloride (PVC) waterstops: Corps of Engineers CRD-C 572.
 3. Preformed Plastic Waterstops: Federal Specifications SS-S-210A "Sealing Compound for Expansion Joints".
 - a. Manufacturers: Synko-Flex Products, Inc.
 4. Bentonite Waterstop RX manufactured by American Volclay Products.
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- C. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171:
1. Waterproof paper.
 2. Polyethylene film.

3. Polyethylene-coated burlap.
 4. Polyethylene-coated natural cellulose fabric such as "Aquacure" by Greenstreak Group, Inc.
 5. Cover for Industrial Slab: Provide a low permeance moisture-retaining cover that allows a moisture loss of no more than 1 lb/sq. yd. in 72 h when tested in accordance with ATSM C 156 for industrial slabs. The material shall be nonstaining with a tensile strength meeting ASTM D 882 and a minimum retention capacity of 6.5 g.
- D. Slip-resistive Emery Aggregate or Aluminum Granule Finish: Provide fused aluminum-oxide granules, or crushed emery, as abrasive aggregate for slip-resistive finish. The emery aggregate shall contain not less than 50% aluminum oxide and not less than 20% ferric oxide. The aluminum aggregate material shall contain not less than 95% fused aluminum-oxide granules. Use material that is factory-graded, packaged, rust-proof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.
1. Subject to compliance with requirements, provide one of the following:
 - a. Emery Tuff Non-Slip; Dayton-Superior.
 - b. Grip-It or Grip-It AO; L&M Construction Chemicals, Inc.
 - c. MasterTop 120 SR; Master Builders Solutions US LLC.
- E. Colored, Mineral Aggregate, Dry Shake Surface Hardener: Packaged, dry, combination of materials, consisting of portland cement, graded quartz aggregate, coloring pigments (if required) and plasticizing admixtures. Use coloring pigments that are finely ground, non-fading mineral oxides, interground with cement. Color, as selected by Architect, unless otherwise indicated.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Surfex; the Euclid Chemical Company.
 - b. Quartz Plate; L & M Const. Chemical Co.
 - c. Lithochrome; LM Scofield Construction Chemical Co.
 - d. MasterTop 100; Master Builders Solutions US LLC.
 - e. Quartz-Tuff; Dayton Superior.
 - f. US Spec Dense Top; US Mix Co.
 2. Submit manufacturer's certification that product conforms to the requirements specified.
- F. Bonding Compound: Polyvinyl acetate or acrylic base, for use in cosmetic and/or nonstructural repairs.
1. Use type I in areas not subject to high humidity or immersion in water with minimum bond strength of 400 psi.
 2. Use type II in areas subject to high humidity or immersion in water with minimum bond strength of 1250 psi.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Acrylic or Styrene Butadiene:
 - 1) Day-Chem Ad Bond (J-40); Dayton Superior.

- 2) SBR Latex; The Euclid Chemical Company.
- 3) Daraweld C; W. R. Grace.
- 4) MasterEmaco A 400; Master Builders Solutions US LLC.
- 5) MasterEmaco A 660; Master Builders Solutions US LLC.
- 6) SikaLatex; Sika Chemical Co.
- 7) Intralok; W. R. Meadows.
- 8) US Spec Acrylcoat; US Mix Co.
- 9) Akkro 7-T; the Euclid Chemical Company.

b. Polyvinyl Acetate (Interior Use Only)

- 1) Tammseld; the Euclid Chemical Company.
- 2) Everweld; L & M Construction Chemicals, Inc.
- 3) Superior Concrete Bonder (J-41); Dayton Superior.
- 4) US Spec Bondcoat; US Mix Co.

G. Epoxy Products: Two component material suitable for use on dry or damp surface, complying with ASTM C 881.

1. Products for Crack Repair:

- a. Sikadur 35 Hi Mod LV"; Sika Chemical Company – injection type.
- b. Sikadur 52; Sika Chemical Company – injection type.
- c. Sikadur 55 SLV; Sika Chemical Company – gravity feed.
- d. Eucopoxy Injection Resin," the Euclid Chemical Company.
- e. Sure-Inject (J-56)," Dayton Superior.
- f. MasterEmaco ADH 326; Master Builders Solutions US LLC.
- g. MasterInject 1380 (injection or gravity feed); Master Builders Solutions US LLC.
- h. MasterEmaco ADH 327 RS; Master Builders Solutions US LLC.
- i. MasterEmaco ADH 1090 RS; Master Builders Solutions US LLC.
- j. ETI-LV" or "ETI-GV; Simpson Strong-Tie Co., Inc. – injection type
- k. Pro-Poxy 100 LV" or "Pro-Poxy 50; Unitex
- l. Crackbond; U.S. Anchor Corp.
- m. Rezi-Weld LV; W. R. Meadows.
- n. US Spec Maxibond" US Mix Co. – injection or gravity feed.
- o. US Spec Eposeal LVS; US Mix Co. – gravity feed.
- p. Duralcrete LV; the Euclid Chemical Company.

2. Products for Epoxy Mortar Patches:

- a. MasterEmaco ADH 1090 RS; Master Builders Solutions US LLC.
- b. MasterSeal 350; Master Builders Solutions US LLC.
- c. Sikadur Lo-Mod LV; Sika Chemical Corporation.
- d. Duralcrete; the Euclid Chemical Company.
- e. Sure Grip Epoxy Grout (J-54)," Dayton-Superior.
- f. Epofil; BASF Building Systems.
- g. Pro-Poxy 2500; Unitex.
- h. Rezi-Weld 1000; W. R. Meadows.
- i. US Spec EPM 3000; US Mix Co.
- j. Duralcrete LV; the Euclid Chemical Company.

3. Products for Epoxying steel plates to concrete: conform to ASTM C 881-90, Type IV, Grade 3, Class A, B, & C except gel times.
 - a. MasterEmaco ADH 327 RS; Master Builders Solutions US LLC.
 - b. Sikadur 31 Hi-Mod Gel; Sika Corporation
 - c. Sure Anchor I (J-S1); Dayton Superior
 - d. Epo Gel or Rapid Gel; BASF Building Systems
 - e. Pro-Poxy 300; Unitex
 - f. US Spec Gelbond NS; US Mix Co.
 - g. Duralcrete Gel; The Euclid Chemical Company.
4. Products for Adhesive Anchors or Reinforcing Steel in Normal weight Concrete. Product that conforms to ASTM C 881-02, Type IV, Grade 3, Class A, B, & C except gel times, and that is dispensed from a two-component cartridge system through a mixing nozzle that thoroughly mixes the two components as it is injected into the hole.
 - a. ICC Approval: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published, currently valid, Evaluation Report showing it as having passed Acceptance Criteria 308 shall be approved for use.
 - b. Consult with the manufacturer for the minimum temperature of the concrete substrate allowed.
 - c. All anchors installed upwardly inclined require continuous inspection unless an exception to the continuous special inspection for upwardly inclined installation is noted on the drawings.
 - d. Normal weight Concrete:
 - 1) HIT-RE 500-SD; Hilti Fastening Systems (periodic inspection unless anchors are installed upwardly inclined)
 - 2) SET-XP Adhesive; Simpson Strong-tie (periodic inspection unless higher factors are used in design requiring continuous inspection as noted on the drawings or anchors are installed upwardly inclined)
 - 3) PE 1000+; Powers Fasteners, Inc. (periodic inspection unless anchors are installed upwardly inclined)
 - 4) HIT-HY 150 MAX-SD", Hilti Fastening Systems (periodic inspection unless anchors are installed upwardly inclined)
 - e. Lightweight Concrete:
 - 1) No approved products.
 - f. These products may not be used in concrete cast over corrugated deck.
 - g. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state of Oklahoma and furnished to the Engineer for review and approval prior to commencement of work.

The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

H. Self-Leveling Mortars, Underlayment Compound: Free flowing, self-leveling, pumpable cementitious base compound. Follow manufacturer's instruction regarding the use of a bonding agent.

1. Products: Unless specified otherwise, provide one of the following:

- a. MasterTop 110 SL; Master Builders Solutions US LLC.
- b. Sikatop 111; Sika Chemical Co.
- c. Flo-Top or "Super Flo-Top; the Euclid Chemical Company.
- d. Levelayer I; Dayton Superior.
- e. US Spec Self-leveling Underlayment; US Mix Co.
- f. Level Magic; the Euclid Chemical Company.

I. Polymer Patching Mortar: Polymer and microsilica modified cementitious based compounds.

1. Horizontal Application

- a. Thin Top Supreme, Concrete Top Supreme; the Euclid Chemical Company
- b. Sikatop 121 or 122; Sika Chemical
- c. MasterEmaco T 310 CI; Master Builders Solutions US LLC
- d. MasterEmaco N 420 CI; Master Builders Solutions US LLC
- e. US Spec H2 or NuTop; US Mix Co. Speed Crete PM; the Euclid Chemical Company

2. Upwardly Inclined Application

- a. Verticoat/Verticoat Supreme; the Euclid Chemical Company
- b. Sikatop 123; Sika Chemical
- c. MasterEmaco N 425; Master Builders Solutions US LLC
- d. MasterEmaco N 420 CI; Master Builders Solutions US LLC
- e. US Spec V/O Patch; US Mix Co.
- f. Speed Crete PM; the Euclid Chemical Company

J. High Strength Flowing Repair Mortar: For forming and placing structural members, or large horizontal repairs, provide flowable one-part, high strength microsilica polymer modified repair mortar with 3/8" aggregate. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.

1. Products: Unless specified otherwise, provide one of the following:

- a. MasterEmaco S 466 CI; Master Builders Solutions US LLC
- b. US Spec STR Mortar; US Mix Co.
- c. Eucocrete; the Euclid Chemical Company

- d. Form and Pour, the Euclid Chemical Company
- K. Anti-Corrosive Epoxy/Cementitious Adhesive: Water-based epoxy/cementitious compound for adhesion and corrosion protection or reinforcing members (20 hour maximum open time).
- 1. Products: Unless specified otherwise, provide one of the following:
 - a. Duralprep A.C; the Euclid Chemical Company
 - b. Arimatec 110; Sika Chemical Co.
 - c. MasterEmaco P 124; Master Builders Solutions US LLC
- L. Expansion and Undercut Anchors in Concrete:
- 1. ICC Approval: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICCES) with a published, currently valid, Evaluation Report showing it as having passed Acceptance Criteria 193 and approval for use in cracked concrete and resisting wind and seismic loads shall be approved for use.
 - 2. Type: All expansion and undercut anchors in concrete shall be only wedge type expansion, sleeve- type expansion, or undercut type anchors.
 - 3. Interior Use: All anchors, nuts and washers for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.
 - 4. Exterior or Exposed Use: All anchors, nuts and washers for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized anchors, nuts and washers shall conform to ASTM A 153. Stainless steel anchors shall be manufactured from 300 series stainless steel and nuts and washers from 300 series or Type 18-8 stainless steel.
 - 5. Nuts and Washers: Nuts and washers shall be furnished from the manufacturer and used with the anchors.
 - 6. Acceptable Products and Manufacturers – Normal and Lightweight Concrete:
 - a. Kwik Bolt TZ; Hilti Fastening Systems (periodic inspection)
 - b. HDA Undercut Anchor; Hilti Fastening Systems (continuous inspection)
 - c. HSL-3 Heavy Duty Sleeve Anchor; Hilti Fastening Systems (continuous inspection)
 - d. Strong-Bolt Wedge Anchor; Simpson Strong-Tie, Co., Inc. (continuous inspection)
 - e. Red Head Trubolt + Wedge Anchor; ITW Red Head (periodic inspection)
 - f. DUC Undercut Anchor; USP Structural Connectors (continuous inspection)
 - g. Power Stud + SD1; Powers Fasteners, Inc (periodic inspection)
 - h. Power Stud + SD2; Powers Fasteners, Inc (periodic inspection)
 - i. SRS TZ Carbon Steel Anchor; MKT Metall-Kunststoff-Technik (continuous inspection)
 - 7. Acceptable Products and Manufacturers – Normal and Light Weight Concrete on Corrugated Deck:
 - a. Kwik Bolt TZ; Hilti Fastening System (periodic inspection)

- b. Strong-Bolt Wedge-Anchor; Simpson Strong-Tie, Co, Inc. (continuous inspection)
 - c. Power Stud + SD2; Powers Fasteners, Inc. (periodic inspection)
8. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state where the project is located and furnished to the Engineer for review and approval prior to commencement of work. The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

M. Screw and Insert Anchors in Concrete

- 1. Approvals: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published, currently valid, Evaluation Report showing it as having passed Acceptance Criteria 193 and approved for use in cracked concrete and resisting wind and seismic loads shall be approved for use.
- 2. Interior Use: All screw anchors for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.
- 3. Exterior or Exposed Use: All screw anchors for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized anchors shall conform to ASTM A 153. Stainless steel anchors shall be manufactured from 300 series stainless steel.
- 4. Acceptable Products and Manufacturers – All Conditions:
 - a. Titen HD; Simpson Strong-Tie Co., Inc (continuous inspection)
 - b. Snake+Anchor; Powers Fasteners, Inc. (periodic inspection)
 - c. Wedge-Bolt+; Powers Fasteners, Inc. (greater than ¼ in. diameter) (periodic inspection)
- 5. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state of Texas and furnished to the Engineer for review and approval prior to commencement of work. The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

N. Threaded Rods Chemically Anchored in Concrete

1. Type: Threaded rods installed in holes using a chemical anchoring process shall have a 45° chiseled end on one end.
2. Interior and Exterior Application: Meet the requirements of ASTM A 153 galvanized steel, or F 593, Group 1 or 2, condition CW stainless steel.

O. Anchor Rods:

1. All anchor rods shall conform to the ASTM designation and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:
 - a. ASTM F 1554, Grade 36 (1/4 inch to 4 inches in diameter).
 - b. ASTM F 1554, Grade 55 (1/4 inch to 4 inches in diameter). (Also comply with Supplementary Requirement S1 of ASTM F 1554)
 - c. ASTM F 1554, Grade 105 (1/4 inch to 3 inches in diameter).
 - d. ASTM A 588 (corrosion resistant).
 - e. ASTM A 354 Grade BD, 130 ksi (to 2 ½ inches in diameter).
 - f. ASTM A 354 Grade BD, 115 ksi (greater than 2 ½ inches to 4 inches in diameter).
 - g. ASTM A 354 Grade BC, 109 ksi (to 2 ½ inches in diameter).
 - h. ASTM A 354 Grade BC, 99 ksi (greater than 2 ½ inches to 4 inches in diameter).
2. Anchor rods used with ASTM A 588 base plates shall be threaded round stock conforming to ASTM A 588, grade 50.
3. Anchor rods used with ASTM A 588 base plates shall be threaded round stock conforming to ASTM A 588, grade 50.
4. Anchor rods used with galvanized base plates shall be galvanized.
5. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.
6. Washers: Unless noted otherwise on the drawings, washer size and thickness for all anchor rods shall conform to Table 14-2 of AISC "Steel Construction Manual" with holes 1/16" greater than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.

P. Non-Shrink Grout:

1. Type: Grout for base plates, bearing plates and grouting under precast or tilt-up wall panels shall be a non-metallic, shrinkage resistant, premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents and fluidity improving compounds.
2. Specifications: Non-shrink grout shall conform to ASTM C 1107.
3. Compressive Strength: Provide the minimum strength as shown below as determined by grout cube tests at 28 days:
 - a. 6,000 PSI for supporting concrete 3000 psi and less.
 - b. 8,000 PSI for supporting concrete greater than 3000 psi and less than or equal to 4000 psi.

- c. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4000 psi shall be 8000 psi.
- 4. Products: Acceptable non-shrink grouts are listed below:
 - a. Crystex; L & M Construction Chemicals, Inc.
 - b. MasterFlow 713; Master Builders Solutions US LLC.
 - c. MasterFlow 555; Master Builders Solutions US LLC.
 - d. MasterFlow 100; Master Builders Solutions US LLC.
 - e. Five Star Grout; U. S. Grout Corp.
 - f. NS Grout; the Euclid Chemical Company
 - g. Sure-Grip High Performance Grout; Dayton Superior Corp.
 - h. CG 200 PC; Hilti, Inc.
 - i. CG-86 Grout; W. R. Meadows
 - j. US Spec GP Grout; US Mix Co.
- 5. High Flow, Non-Metallic Grout: Use high-flow grout where high fluidity and/or increased placing time is required and for base plates that are larger than 10 square feet. The factory pre-mixed grout shall conform to ASTM C 1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (NonShrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 18" x 36" base plate. Provide one of the following:
 - a. Hi-Flow Grout; the Euclid Chemical Company
 - b. MasterFlow 928; Master Builders Solutions US LLC.
 - c. 588 Grout; W. R. Meadows
 - d. US Spec MP Grout; US Mix Co.
- Q. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gage galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- R. Carton Forms: Carton forms shall be manufactured using corrugated paper material with a moisture resistant exterior surface and specifically designed for foundation support. Carton forms shall be designed to support the wet weight of the concrete that is shown by the details to be placed on top of the form but not less than 600 psf. Refer to the Reinforced Concrete General Notes for the restriction on horizontal construction joints. The forms shall be designed in such a way that the bottom of the form will collapse when acted upon by upward movement of the soil.
 - 1. Form Configuration: Carton forms shall be of a vertical cellular configuration only, except as permitted by item 4 below, and shall be rectangular as shown on the details. The depth of the carton forms is shown on the details. Forms shall be manufactured to fit snugly against round piers and shall be baffled in such a way as to prevent concrete from flowing back into the form during the concrete placement. The Contractor shall use expandable foam to fill all gaps and holes between carton forms and at intersections with foundations.
 - 2. Carton forms shall be kept dry and protected until concrete is placed. Wet, compressed, or deteriorated carton forms shall not be used. Do not wrap or cover

- carton forms with polyethylene sheets or permanent waterproof cover as that will prevent proper deterioration of the forms.
3. Technical data and brochures on carton forms shall be submitted for Engineer's review.
 4. Other types of forms using different types of paper and different configurations will be accepted if it can be shown by independent tests that the form will properly function and will deteriorate due to moisture in an appropriate time frame.
 5. For slab conditions, cover carton forms with a 1/4 inch masonite protection cover board to prevent puncture and other damage during construction.
 6. Products: Subject to requirements, acceptable manufacturers include but are not limited to the following:
 - a. SureVoid Products, Inc., Englewood, CO
- S. Contraction and Construction Joint-Filler Material for Slabs-on-Ground: Provide a 2-component semi-rigid, 100% solids epoxy having a minimum shore A hardness of 80 when tested in accordance with ASTM D 2240 and an elongation below 25% when measured in accordance with ASTM D 638. Subject to compliance with requirements, provide one of the following:
1. Euco 700; the Euclid Chemical Company
 2. Spec-Joint CJ; Conspec Marketing and Manufacturing Co., Inc.
 3. MasterSeal 190 CR; Master Builders Solutions US LLC
 4. MM-80; Metzger/McGuire Co.
 5. Rezi-Weld Flex; W. R. Meadows
 6. US Spec SR-50 EJF; US Mix Co.
- T. Bond breaker for Construction Joints in Slabs-on-Ground: A dissipating bond breaking compound containing no silicones, resins, or waxes, and that conforms to ASTM C 309. Subject to compliance with requirements, acceptable manufacturers include the following:
1. Sure-Lift; Dayton Superior Corporation, Inc.
 2. Tilt-Eez; Conspec Marketing and Manufacturing Co., Inc.
- U. Joint-Filler Strips for Isolation Joints in Slabs-on-Ground: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork. In post-tensioned slabs or shrinkage-compensated slabs, use compressible isolation-joint filler material that does not develop a stress greater than 25 psi at 50% strain when tested in accordance with ASTM D 1621 or D 3575.
- V. Rigid-Cellular-Polystyrene Boards use as Fill under Topping Slabs or Slabs-on-Ground:
1. Provide rigid, expanded (EPS) or extruded (XPS) cellular polystyrene boards that conform to ASTM D 6817 or ASTM C 578 with a minimum density of 1.0 lb/ft³. Subject to compliance with requirements, acceptable manufacturers include the following:
 - a. STYROFOAM Brand; Dow Chemical Company
 - b. R-Control EPS Geofoam - All grades; R-Control Building Systems
 - c. EPS Geofoam; Carpenter Co.
 - d. Knauf Geofoam; Knauf Polystyrene

- e. Insulfill; Premier Industries
- W. Synthetic Microfiber Reinforcement: Collated, fibrillated, or monofilament polypropylene, cellulose, or multi-filament nylon fibers engineered and designed for use in concrete, conforming to ASTM C 1116, Type III or Type IV.
 - 1. Products: Acceptable non-shrink grouts are listed below:
 - a. Fiberstrand; the Euclid Chemical Company
 - b. Econo-Mono or Econo-Net; Forta Corp.
 - c. Fibermesh 300; Propex Concrete Systems, Corp.
 - d. Grace Microfibers or Grace Fibers; W.R. Grace & Co.
 - e. Caprolan-RC; Honeywell Nylon Inc.
 - f. Nycon RC; Nycon, Inc.
 - g. UltraFiber 500; Buckeye Technologies, Inc.
 - h. MasterFiber M or F series; BASF Construction Chemicals

2.3 PROPORTIONING AND DESIGN OF CONCRETE MIXES

- A. The Contractor shall submit concrete mix designs for each class of concrete indicated on the structural drawings and in the Specifications for approval by the Engineer at least 15 working days prior to the start of construction. If required, the Contractor shall engage the services of an independent Testing Laboratory to assist in preparing the mix design. The Contractor shall not begin work with a particular mix until that mix design has been approved.
- B. Required types of concrete and compressive strengths shall be as indicated on the Structural Drawings.
- C. Low Alkali Concrete: For concrete identified on the drawings as exposed to exposure classes C1 and C2, the total alkali contribution from cementitious materials in the concrete mix shall not exceed 4.0 pounds per cubic yd of concrete unless the aggregate used is certified to contain no deleterious materials that react with alkalis in the concrete mix as defined in ASTM C 33. This requirement may be met by the use of low- alkali cement.
- D. Lightweight Structural Concrete:
 - 1. Comply with the requirements of ACI 211 and ACI 301.
 - 2. Provide concrete with a dry unit weight of not more than 116 pounds per cubic foot and not less than 110 pounds per cubic foot. Design mix to produce strengths as indicated on the drawings with a split cylinder strength factor ($f_{ct}/(f'_c)^{0.5}$) of not less than 5.7.
- E. Aggregate: Comply with the following special requirements:
 - 1. Material: Clean, hard, durable, angular, and sound consisting of gravel, crushed gravel, crushed stone, crushed concrete, slag, sand or combination.
 - 2. Source: Use the following requirements to determine suitability of aggregate source and not for project control.
 - a. Deleterious Substances and Physical Properties:

- 1) Coarse Aggregate: Class designation 4S in table 3 in ASTM C 33.
 - 2) Fine Aggregate: Table 1 in ASTM C 33. Organic impurities producing a dark color concrete may cause rejection.
3. Comply with the following special requirements:
- a. For exposed concrete, provide aggregates from a single source.
 - b. For exposed surfaces subject to Exposure Class C1 or C2, do not use aggregates containing spalling-causing deleterious substances.
 - c. For slabs and other designated concrete, combined aggregate gradation shall be 8% - 18% for large top size aggregates (1 1/2 in.) or 8% - 22% for smaller top size aggregates (1 in. or 3/4 in.) retained on each sieve below the top size and above the No. 100. Deviations from this gradation may be allowed upon the approval of the Engineer subject to the following limitations:
 - 1) The percent retained on two adjacent sieves shall be not less than 5%.
 - 2) The percent retained on three adjacent sieves shall be not less than 8%.
 - 3) If the percent retained on two adjacent sieves is less than 8%, the total percent retained on either of those sieves and the adjacent outside sieve shall be not less than 13 %

F. Admixtures:

1. Admixtures to be used in concrete shall be subject to the approval of the Engineer and shall be used for the purpose intended by the manufacturer to produce concrete to meet the specified requirements.
2. Quantities of admixtures to be used shall be in strict accordance with the manufacturer's instructions.
3. Adjustments of Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Such mix design adjustments shall be provided at no additional cost to the Owner. Any adjustments in approved mix designs including changes in admixtures shall be submitted in writing with the specified Concrete Mix Design Submittal Form to the Engineer for approval prior to field use.
4. Lightweight Structural Concrete:
 - a. Comply with the requirements of ACI 211 and ACI 301.
 - b. Provide concrete with a dry unit weight of not more than 116 pounds per cubic foot and not less than 110 pounds per cubic foot. Design mix to produce strengths as indicated on the drawings with a split cylinder strength factor ($f_{ct}/(f'_c)0.5$) of not less than 5.7.
5. Shrinkage: Concrete so identified on the drawings shall be proportioned for maximum allowable unit shrinkage, measured at 28 days after curing in lime water as determined by ASTM C 157 (using air storage).
6. Chloride Ion Content:

- a. Unless noted otherwise, The maximum water soluble chloride ion concentration in hardened concrete measured at ages from 28 to 42 days contributed from all ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits specified in ACI 318-14 Table 19.3.2.1 depending on to which Corrosion Exposure Class (CO, C1 or C2) the concrete is subject. Water-soluble chloride ion tests shall conform to ASTM C 1218. One test shall be run for each class of concrete before the mix design submittal and each time a change is made to the mix design (such as change in aggregate type or source).
 - b. The chloride ion content in all concrete used for prestressed or post-tensioned concrete shall not exceed .06 percent by mass of cementitious materials.
 - c. The Concrete Supplier shall certify on the Mix Design Submittal Form that the chloride ion content in all concrete mix designs used on the project does not exceed the limits stated above.
7. Pozzolan:
 - a. Natural or fly ash per ASTM C 618.
 - b. Silica fume per ASTM C 1240.
 - c. Slag cement per ASTM C989.
 - d. Metakaolin per ASTM C618.
8. Special Admixtures: Allowed if mix design submittal is accepted.
 - a. Lithium nitrate based solution for control of reactive aggregates.
 - b. Calcium nitrite based solution for corrosion protection of reinforced structures subject to chloride-induced corrosion.
 - c. Shrinkage reducer for controlling drying shrinkage in concrete.
 - d. Viscosity modifier for enhancement of self-consolidating concrete or for workability.
9. Mix Design
 - a. Selection of Cement: ASTM C 150 or C 1157.
 - 1) For sulfate resistance, use Type V Portland cement, or Type II with Class F fly ash, silica fume or combination thereof. Class F fly ash may be used as an addition to Type V Portland cement.
 - 2) Do not use fly ash with Type IP(MS) or Type III Portland cement.
 - b. Selection of Aggregates.
 - 1) Maximum Particle Size:
 - a). 1/5 of narrowest dimension between forms.
 - b). 1/3 of depth of slab.
 - c). 3/4 of minimum clear spacing between reinforcing bars.
 - 2) Gradation: ASTM C 33.

c. Selection of Pozzolan:

- 1) General: If a blended aggregate passes an unmodified ASTM C 1293 test, use of a pozzolan is CONTRACTOR's choice, otherwise select a pozzolan (or blended cement, or both) and determine the effective dosage to meet one of the following tests.
 - a). ASTM C 1567. The expansion of a cement-pozzolan-aggregate job-mix mortar bar is less than or equal to 0.10 percent at 16 days. Do not use this test if a lithium admixture is used in the job-mix.
 - b). ASTM C 441. The expansion of a test mixture at 56 days is less than or equal to a control mixture prepared with cement with equivalent alkalis between 0.5 and 0.6 percent.
 - 2) Fly Ash (Class F): Allowed as a cement replacement under the following conditions.
 - a). Before replacement is made, use the minimum cement content in the design formula to establish the water/cement ratio.
 - b). Submit to ENGINEER a quality history of the fly ash identifying a minimum of 15 of the most current ASTM C 618 analysis.
 - 3) Natural Pozzolan (Class N): Allowed as a cement replacement if the 14 day expansion test (ASTM C 1567) with job aggregates, job cement and natural pozzolan does not exceed the 14 day expansion test of job aggregates, job cement and Class F fly ash.
 - 4) Silica Fume: Allowed as a cement replacement if replacement of hydraulic cement on a 1 part silica fume to 1 part cement does not exceed 10 percent, and water/cement ratio is established before cement is replaced with silica fume.
10. Selection of Fiber Reinforcement: The basis for determining material proportions of fiber- reinforced concrete is the Supplier's responsibility per ASTM C 1116 subject to mix property requirements of this Section. Unless specified otherwise provide synthetic fibers.
 11. Selection of Mix Properties: Select and proportion mix to produce appropriate strength, durability and workability. Use ACI 211.1, 211.2, or 211.3.
 12. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, Ready Mixed Concrete.

G. SOURCE QUALITY CONTROL

1. Once selected, do not change source quality control sampling point.
2. Aggregate:
 - a. Soundness, ASTM C 88.
 - b. Alkali-silica Reactivity: ASTM, C 1567, and C 1293.
 - c. Petrographically examine fine and coarse aggregate sources once every 3 years per ASTM C 295.

3. Concrete Mix: Obtain samples per ASTM C 172 and run the following tests.
 - a. Compressive strength, ASTM C 39.
 - b. Density, ASTM C 138.
 - c. Slump, ASTM C 143
 - d. Air, ASTM C 231.
 - e. Temperature, ASTM C 1064.
4. Concrete Quality Charts: Comply with ACI 214 and ACI 301. Plot new results and identify trends on quality control charts that comply in form to ASTM STP 15-C. Show the Specified Strength (fc'), the required Average Strength (fcr), and the compressive strength versus date of Sample.
5. Equipment: Certify through the services of a professional engineer that trucks and plant equipment comply with the requirements of the National Ready Mixed Concrete Association. Do so at least every 2 years.
 - a. Transit Trucks: Equip transit trucks with plates indicating total volume, agitating volume and mix volume.
 - b. Weights and Measures: Comply with regulatory requirements of State of Oklahoma.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Concrete Placement, Section 03 30 10.
- B. Driveways, sidewalks, curb, gutter, Section 32 13 14.
- C. Concrete Paving, Section 32 13 13.

3.2 FIELD QUALITY CONTROL

- A. A Truck Mixed Concrete (Dry Batch): ASTM C 94.
 1. Truck Mixer: Fill drum no more than 63 percent of the gross drum volume and no less than 2 cubic yards. Use drum manufacturer's recommended mixing speed (between 12 - 18 rpm).
 2. Truck Agitator: Do not fill drum greater than 80 percent of the gross drum volume. Use drum manufacturer's recommended agitating speed (between 2 – 6 rpm).
- B. Mixing Plant: ASTM C 94.
 1. Use option C and requirements in this section for preparing ready-mixed concrete.
 2. Use scales certified by the State of Oklahoma. Do not use volume measurement except for water and liquid admixtures.
 3. Mixing time must exceed 80 seconds after adding air entrainment admixture.
- C. Hand Mixing:
 1. Do not hand mix batches larger than 0.5 cubic yard.

2. Hand mix only on a watertight platform.
3. Ensure all stones are thoroughly covered with mortar and mixture is of uniform color and consistency prior to adding water.

END OF SECTION

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SECTION 03 30 05
CONCRETE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the work of this section.
- B. Concrete testing is required for exterior equipment pads and concrete repair.

1.2 SECTION INCLUDES

- A. Concrete sampling and testing requirements.

1.3 REFERENCES

(Current Edition at Date of Bid)

- A. ACI 318: Building Code Requirements for Structural Concrete.
- B. ASTM C 31: Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- C. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- D. ASTM C 42: Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- E. ASTM C 78: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
- F. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- G. ASTM C 138: Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- H. ASTM C 143: Standard Test Method for Slump of Hydraulic-Cement Concrete.
- I. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete.
- J. ASTM C 173: Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
- K. ASTM C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- L. ASTM C 567: Standard Test Method for Determining Density of Structural Lightweight Concrete.

- M. ASTM C 1064: Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
- N. ASTM C 1077: Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.

1.4 SUBMITTALS

- A. Concrete Supplier: If requested, submit reports and material certificates verifying concrete quality control.
- B. Laboratory: Promptly submit test data results for 7 and 28 day breaks to Supplier, CONTRACTOR and ENGINEER.

1.5 QUALITY ASSURANCE

- A. Provide an ASTM C 1077 compliant and ACI certified laboratory.
- B. Provide Level I ACI certified field sampling technicians.

1.6 SITE CONDITIONS

- A. Assist ENGINEER: Furnish labor to assist ENGINEER in obtaining and handling acceptance samples at site or sources.
- B. Store and Cure Test Specimens: Safely store and cure concrete test specimens and acceptance test specimens for first 24 hours.
 - 1. Follow ASTM C 31 in making and curing cylinders or beams at site. Do not move the cylinders or beams for the initial 16-hour cure period. Provide initial cure temperature as follows.
 - a. 60 to 80 deg. F. for Class 4,000 or less.
 - b. 68 to 78 deg. F. for Class 5,000 or greater.
 - 2. Equip storage device with an automatic 24-hour temperature recorder with an accuracy of plus or minus 2 deg. F.
 - 3. Use water containing hydrated lime if water is to be in contact with cylinders or beams.
 - 4. Ensure the device(s) can accommodate the required number of test cylinders or beams. Lack of capacity will cause the placement of concrete to cease.
 - 5. Have the storage devices available at the point of placement at least 24 hours before placement.
 - 6. A 24-hour test run may be required.

1.7 ACCEPTANCE

- A. At the Site:
 - 1. Sampling: ASTM C 172. Reject non-complying batches until 2 consecutive batches are compliant then proceed in random batch testing for acceptance.

Table 1 - Concrete Mix

Rate of Placement (Cubic Yard / Day)	Temperature	Air	Slump	Density	Strength
0 - 8	1	1	1	1	Determined by ENGINEER
0 - 50	1	1	1	1	1
Each additional 50 cu. yd. or fraction	1	1	1	1	1

NOTES:

Sampled at discharge chute prior to placement, or at pumper hose after priming grout has been wasted.

2. Temperature, ASTM C 1064.
3. Air content, ASTM C 231 or ASTM C 173 if lightweight aggregate is used.
4. Slump, ASTM C 143.
5. Density, ASTM C 138.

B. At the Laboratory:

1. Compressive strength, ASTM C 39.
2. Flexural strength, ASTM C 78.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. Concrete testing is required for exterior equipment pads and concrete parking lot repair.

3.2 PRECAST PRODUCTS

- A. Obtain composite Samples from different portions of the batch.
- B. Make and cure concrete test specimens for acceptance, ASTM C 31.
- C. Cure all precast products with water vapor or water.
- D. Do not damage precast products by stripping forms or handling before the concrete reaches its specified strength.

3.3 CAST-IN-PLACE PRODUCTS

- A. Concrete testing shall be arranged by Contractor and paid for by the Owner. Any retesting due to test failure shall be paid for by the Contractor. Test results to be provided to the Architect/Engineer, and Contractor.
- B. Evaluation of test results:

1. Concrete strength is considered satisfactory if every arithmetic averages of any three consecutive strength tests results equal or exceed the specified strength fc' and no individual strength test result falls below specified strength fc' by more than 500 psi if fc' is 5000 psi or less; or by more than $0.10 fc'$ if fc' exceeds 5000 psi.
2. Other items tested are considered satisfactory if the test result falls within the specified parameters (i.e. if air entrainment is within 1-1/4% of 6-1/4%).

C. Concrete Testing Requirements: (Require the testing agency to do the following)

1. Respond to the CONTRACTOR's requests for testing in a timely manner. Report all test and inspection results to the project manager and the CONTRACTOR immediately, especially when there appears to be a problem.
2. Review and/or test materials for compliance with specifications.
 - a. Secure production samples of materials at plants or stock-piles during course of work and test for compliance with specifications.
 - b. Perform strength testing of concrete with one strength test for each 50 CY, or fraction thereof, of each mix design of concrete placed in any one day. Each test shall include four cylinders (one to be broken at 7 days and three at 28 days).
 - c. Determine compliance with water/cement ratio requirements through use of the slump test on each batch of concrete delivered. Specify required slump and acceptable variance for each design mix.
 - d. Determine compliance with air content requirements by testing each batch of concrete delivered.
 - e. Determine concrete temperature compliance by taking temperature reading on each batch of concrete delivered.
 - f. Identify the location of placement of tested concrete in testing report.

D. Duties:

1. Provide necessary testing services for qualification of proposed materials and mix designs.
2. Materials and mix design submittals.
3. Facilitate testing by advising testing agency in advance of operations requiring testing. Furnish labor to assist the testing agency in obtaining and handling samples at job site or sources of materials. Provide and maintain adequate facilities for safe storage and proper curing of concrete test specimens on site for first 24 hours.
4. Responsible for testing costs and remedial work required as a result of failed tests.

E. Acceptance: If any test is below the specified strength shown, the concrete may be accepted at a reduced price. The price reduction shall apply to the amount of concrete represented by the strength test as follows:

PSI Below Specified Strength Specifications	Pay Factor
1-100	0.98
101-200	0.94
201-300	0.88
301-400	0.80

*Concrete with compressive strength of more than 400 psi below the required strength shall be evaluated by the project manager. The project manager may accept this concrete at a pay factor of 0.50, or require that it be replaced with acceptable material.

F. Obtaining Samples:

1. Batch samples, ASTM C 172.
2. Core samples, ASTM C 42.

G. Identify location of tests on test reports.

H. Compressive strength, ASTM C 39.

1. Mold four 4"x8" test specimens, ASTM C 31.
2. For each strength test perform slump, air, density, and temperature test.
3. Break 1 cylinder at 7 days and 3 cylinders at 28 days. The average strength of 3 cylinder breaks shall be considered the test result.
4. If any one cylinder in a 28 day test shows definite evidence of improper sampling, molding, handling, curing, or testing, discard the cylinder. The average strength of the remaining cylinders shall be considered the test result.
5. Strength: Four cylinders every 50 cubic yards

I. Aggregate, ASTM C 136 for fine and coarse aggregate.

J. Slump test, ASTM C 143.

1. Slump: Test on each truck load.

K. Air Test:

1. Normal weight concrete, ASTM C 231.
2. Light weight concrete, ASTM C 173.
3. Air entrainment: Test on every truck load.

L. Density:

1. Hardened concrete in the lab, ASTM C567. Fresh concrete in the field, ASTM C138.

M. When requested, test in-place concrete by rebound hammer, ultrasonic, or other non-destructive device:

1. To determine relative strengths in various locations in Work.
2. To aid in evaluating concrete strength.
3. To select areas to be cored.
4. To verify quality control in the absence of control testing.

3.4 RETESTING DEFECTIVE CONCRETE

- A. Testing shall be coordinated and paid for by the Construction Manager. Additional testing due to test failure shall be specified to be at the expense of the SUBCONTRACTORS.

- B. If Contractor desires to do a re-test; a request to Engineer for retesting must be made within 35 days from time of concrete placement. No coring or retesting shall be done after 40 days have elapsed from the time of placement.
1. Choose 3 random test locations and verify choice with Engineer. Obtain retest samples per ASTM C 42 and test compressive strength per ASTM C 39 or flexural strength per ASTM C 78.
 2. Establish a chain of custody for all test samples.
 3. If concrete placed in the Work will be dry under service condition, air dry cores for 7 days before tests. Unless otherwise specified, use air temperature 60 to 80 deg. F. and relative humidity less than 60 percent.
 4. If concrete placed in the Work will be more than superficially wet under service conditions, test cores after moisture conditioning (liquid or vapor water cure).
 5. If more than 1 core shows evidence of having been damaged before testing provide replacement cores, otherwise evaluation will be done on 2 or more core samples.
 6. Evaluate cores in accordance with ACI 318 requirements.
 7. If core tests are inconclusive, or impractical to obtain, or if structural analysis does not confirm the safety of the Work, load test may be used and evaluated in accordance with ACI 318 requirements.
- C. Coat sides of core hole with concrete epoxy resin adhesive. Fill core holes with non-shrink concrete mortar. Match color and texture of surrounding concrete.
- D. Within 40 days from time of placement publish the chain of custody record and the results of retesting.

END OF SECTION

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SECTION 03 30 10
CONCRETE PLACEMENT

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Concrete placement for slabs on grade, slabs on fill, structural building frame, and other concrete components.

1.3 REFERENCES

(Current Edition at Date of Bid)

- A. ACI 301: Specifications for Structural Concrete.
- B. ACI 305.1: Specification for Hot Weather Concreting.
- C. ACI 306.1: Standard Specification for Cold Weather Concreting.
- D. ACI 309R: Guide for Consolidation of Concrete.
- E. ASTM C 881: Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- F. ASTM C 1059: Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

1.4 SUBMITTALS

- A. Batch Delivery Ticket: For each batch delivered to site, identify.
 - 1. Date and Project description.
 - 2. Producer and plant.
 - 3. Name of contractor.
 - 4. Serial number of ticket.
 - 5. Mix identification.
 - 6. Truck number and time dispatched.
 - 7. Volume of concrete.
 - 8. Type and amount of cement.
 - 9. Total water and water/cement ratio.
 - 10. Water added for receiver of concrete and receiver's initials.
 - 11. Admixture types.
 - 12. Separate weights of fine and coarse aggregate.
 - 13. Statement of whether batch is pre-mixed at plant or mixed in transit.
- B. Record of Placed Concrete: Identify record date, location of pour, quantity, air temperature, and CONTRACTOR's quality control test samples taken.

- C. Bonding Compound: Identify product name, type, and chemical analysis.

1.5 QUALITY ASSURANCE

- A. Provide ACI certified finishers.
- B. Remove and replace any placed concrete suffering hot or cold weather damage.
- C. For control testing follow Section 03 30 05 requirements.

1.6 ACCEPTANCE

- A. General:
 - 1. Price adjustment, Section 01 20 00. CONTRACTOR may request ENGINEER determine appropriate Modifications or payment adjustments to correct Defective Work.
 - 2. Dispute resolution, Section 03 30 05.
- B. Concrete work that fails to meet any of the following requirements will be considered defective. Replace any Defective Work at no additional cost to the OWNER.
 - 1. Placement:
 - a. Reinforcing steel size, quantity, strength, position, damage, or arrangement is not as specified or does not comply with code.
 - b. Formwork differs from required dimensions or location in such a manner as to reduce concrete's strength or load carrying capacity or physical esthetics.
 - c. Workmanship likely to result in deficient strength.
 - 2. Finishing:
 - a. Concrete exposed to view has defects that adversely affect appearance.
 - b. Slab tolerances of Section 03 35 00 are not met.
 - 3. Protection:
 - a. Method of curing is not as specified.
 - b. Inadequate protection of concrete during early stages of hardening and strength development from.
 - 1) temperature extremes.
 - 2) rapid moisture loss.
 - c. Mechanical injury, construction fires, accidents, or premature removal of formwork likely to result in deficient strength development.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms, Section 03 11 00.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify ENGINEER minimum 24 hours prior to commencement of concrete placement operations.
- B. Do not allow construction loads to exceed structural capacity.
- C. Clean previously placed concrete. Apply bonding compound per manufacturer's instructions.
- D. At locations where new concrete is dowelled to existing work, drill, remove dust, insert and pack steel dowels with shrink compensating grout.

3.2 EXAMINATION

- A. Verify items to be cast into concrete are accurately placed and held securely.
- B. Verify slump, air content range, mix identity, and batch time on delivery ticket matches mix design.
- C. Verify slab steel mats are supported by steel chairs, precast concrete blocks, or other slab bolsters. Do not pour if absent.

3.3 DELIVERY

- A. Slump and Air Content: Keep slump and air content within the allowable range.

- B. Placement Time:

Air Temperature

Less than 90 deg. F.

Greater than 90 deg. F.

Greater than 90 deg. F.

Time after Initial Batching

1–1/2 hours

1–hour (without retarder)

1–1/2 hours (with retarder)

*To increase time past 1-1/2 hours, a hydration stabilizer that is acceptable to Supplier may be used.

- C. Tempering:

1. Use of a workability-retaining admixture MasterSure Z 60 from Master Builders Solutions to retain slump and workability and eliminate or minimize the need for late addition of water.
2. Water may be added if all following conditions are met.
 - a. The mix design water/cement ratio is not exceeded.
 - b. The delivery ticket allows for addition of water based upon water/cement ratio.

- c. The amount of water added is accurately measured to within 1 gallon of the design addition.
 - d. Water addition is followed by 3 minutes of mixing at mixing speed prior to discharge.
 - e. Supplier and CONTRACTOR mutually agree on who is authorized to add water.
 - 3. Do not add water after 1 cubic yard of concrete has discharged from the delivery vehicle.
- D. Super-plasticizer: Comply with manufacturer's requirements. If none, then as follows:
- 1. If added at site, add agent using injection equipment capable of rapidly and uniformly distributing the admixture to the concrete. Prior to discharge, mix for a minimum of 5 minutes at a drum rate not less than 12 rpm or more than 15 rpm.
 - 2. If added at plant; do not deliver to site unless batch delivery ticket displays water/cement ratio prior to super-plasticizer addition.

3.4 CONCRETE PLACEMENT

- A. Materials - Specific requirements:
- 1. Portland Cement: Use Type II cement conforming to ASTM C 150 Low alkali for all on grade or below grade installations. Type I, or I/II may be used in above grade concrete work.
 - 2. Admixtures: Calcium Chloride shall not be used as an admixture.
 - 3. Air Content: Specify 6-1/4% plus or minus 1-1/4%.
 - 4. Pozzolans: Replacement allowed up to 15% of cement with a 1.5 to 1 replacement ratio. Specify loss of ignition at less than 1% and water requirement not to exceed 100%.
 - 5. Synthetic fibrous reinforcement: Specify collated, fibrillated polypropylene with a mix ratio of 1.5 pounds of fiber to 1.0 cubic yards of concrete. To be used in all concrete specified in Division 32.
 - 6. Curing and Sealing: Specify a combination curing and sealing compound to be used on all exposed concrete flatwork complying with the requirements of ASTM C 309 and AASHTO M 148. The compound shall be acrylic based with a minimum of 18 percent solids and a moisture loss of 0.031 grams per cubic centimeter maximum after 72 hours. Specify a two-coat application occurring immediately after surface water dissipation and concrete finishing and at approx. 28 day from placement.
- B. Concrete Strength: Specify a minimum allowable compressive strength (at 28 days from placement) and minimum cement content (bags per cubic yard at 94 lbs. per bag) as follows unless otherwise noted:
- 1. Footings: 3,000 psi and 5.5 bags.
 - 2. All other conditions: 4,000 psi and 6.0 bags.
- C. Concrete proportioning and mixing:
- 1. Specify use of only one type and brand of cement from same mill, and one source of coarse and fine aggregate.

2. Require accurate measurement of all water added to the mix with means for verification.
3. The maximum allowable time between charging of materials in the mixing drum and placement on site is 90 minutes.
4. Ready Mix Concrete: Require a computerized ticket with each batch to be delivered to the project manager that includes the following information:
 - a. Name of ready-mix batch plant.
 - b. Serial number of ticket.
 - c. Date and number of truck.
 - d. Name of CONTRACTOR.
 - e. Specific designation of job (name and location).
 - f. Volume of concrete (number of cubic yards).
 - g. Time batch was dispensed to truck.
 - h. Reading of revolution counter at first addition of water.
 - i. Signature or initials of ready-mix representative.
 - j. Type and brand of cement.
 - k. Amount of cement (can be indicated by weight or quantity).
 - l. Total water content by producer (can be indicated by weight or quantity).
 - m. Water added by receiver of concrete and his initials (can be indicated by weight or quantity).
 - n. Admixtures and amount of same.
 - o. Maximum size of aggregate.
 - p. Weights of fine and coarse aggregates.
 - q. Indication that all ingredients are as previously certified or approved.

D. Concrete Replacement Procedures:

1. Cold Weather

- a. All procedures of ACI 306.1 shall be followed for all concrete construction. A concrete temperature of 50° to 60° F is desirable.
- b. Heating of the concrete aggregate must be approved by Project Manager.
- c. If freezing may occur during curing period, the concrete shall be protected by means of an insulating covering and/or heating to prevent freezing for a period of not less than 10 days after placing.
- d. Submittals shall clearly show procedures for protecting concrete and subsurface. Equipment requirements shall be clearly specified. No combustion heating shall be allowed during the first 24 hours unless precautions are taken to prevent exposure to exhaust gases.

2. Hot Weather

- a. All procedures of ACI 305.1 shall be followed for all concrete construction.
- b. A concrete temperature of 50° to 60°F. is desirable. Special measures must be taken to maintain aggregate and water temperature below 90 degrees Fahrenheit.
- c. Special procedures for wetting forms, reinforcing steel, and supporting earth immediately prior to placing concrete should be given.

- d. If the combination of air temperature, relative humidity and wind velocity causes a rate of evaporation approaching 0.2 lb./square foot per hour, precautions against plastic shrinkage are necessary.
 - e. Sprinkling is acceptable to keep concrete form temperatures down before concrete is placed.
 - f. Measures should be taken to maintain both concrete strength and air entrainment at higher temperatures. If additional water is required to maintain consistency, additional cement and air entrainment admixture should be required as needed.
- 3. Curing of concrete: Curing can be accomplished by water ponding, covering with saturated burlap or cotton mats, continuous sprinkling or by using an approved curing and sealing compound.
- 4. Concrete protection: Protect the concrete from freezing, oil, grease, staining or defacement of any kind until it has set. If such protection is not provided, Removing and replacing the slab is at CONTRACTOR's expense.
- E. Concrete Quality: Specify parameters for acceptance of concrete work and describe measures to be taken when concrete does not meet all parameters such as repair or removal and replacement. Such parameters should include appearance and strength requirements.

3.5 CAST-IN-PLACE CONCRETE

- A. Job Conditions:
 - 1. Do not place concrete on frozen ground.
 - 2. Do not place concrete during rain, sleet or snow unless adequate protection has been provided and authorization has been received from Architect.
 - 3. Do not allow rain water to increase mixing water or to damage the concrete finish.
- B. Project manager inspections: Must receive project manager's approval of all dimensions, steel location, condition of forms, and placing equipment at least four (4) working hours prior to placing any concrete.

C. Adding water to concrete:

1. Do not add water to concrete without the approval of the project manager.
2. Account for all water added to the concrete mix.
 - a. Do not add any water to ready-mix concrete drum unless the following conditions are satisfied:
 - 1) Water is added only while the concrete is mixing in the drum.
 - 2) The mixing truck is equipped with a revolution counter and a working water meter.
 - 3) The delivery ticket provides all information required so that the total amount of water added to the mix can be determined.

D. Joints and embedded items:

1. Construction Joints: Locate and install construction joints as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Project Manager/Engineer.
 - a. Keyways: Provide continuous keyways with a depth of one tenth of the member thickness (1 1/2" minimum or as shown on the drawings) in construction joints only where shown on the drawings.
 - b. Joint Construction: Place construction joints in the center one third of suspended spans and grade beams and as shown on the drawings for slabs-on-grade and walls unless shown otherwise. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise shown on the drawings. Dowels that cross construction joints shall be supported during concreting operations so as to remain parallel with the slab or wall surface and at right angles to the joint. Submit all construction joint locations as a shop drawing submittal.
 - c. Waterstops: Provide waterstops in construction joints as indicated on the Architectural and Structural Drawings. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
 - d. Isolation Joints in Slabs-on-Ground: Construct isolation joints (without dowels) in slabs-on-ground at points of contact between slabs on ground and vertical surfaces only where specifically detailed on the drawings. Install joint-filler strips at joints where indicated. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated on the drawings. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together. Provide construction joints with dowels at all locations unless isolation joints are detailed.
 - e. Contraction joints in slabs-on-grade and unbonded topping slabs: Maximum joint spacing shall be 36 times the slab thickness or 20 feet, whichever is less and at a minimum on column lines unless otherwise noted on the drawings. Use one of the two following methods (sawed or

formed) to create the joints. Do not use the formed joint in areas subject to vehicular traffic or in industrial slabs.

1) Sawed Joints

- a). Primary Method: Early-Entry, dry-cut method, by Soff-Cut International, Corona, CA (800) 776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 1 to 4 hours, depending on air temperature, after final finish as soon as the concrete surface is firm enough to not be torn or damaged by the blade at each saw cut location. Use 1/8 inch thick blade, cutting 1 1/4" inch into the slab.
- b). Optional Method (where Soff-Cut System method equipment is not available, subject to limitations): This method may not be used when there is no dowel passing through the contraction joint. Use a conventional saw to cut joints within 4 to 12 hours after finishing as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/8 inch thick blade, cutting to a depth of 1/4 of the slab thickness but not less than 1 inch. Cut to a depth of 1/3 slab thickness for slabs reinforced with steel fibers.

2) Formed Joints: Form contraction joints by inserting premolded plastic hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. The depth is to be 1/4 the slab thickness, but not less than 1 inch. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

3) Joint Filler: Provide in both contraction and saw-cut construction joints when specified.

- a). Remove dirt and debris from the joint by vacuuming immediately prior to filling the joint. Clean the joint of curing compounds and sealers.
- b). Filler material shall be applied to the joints when the building is under permanent temperature control, but no less than 90 days after slab construction.
- c). Follow the manufacturer's recommended procedure for installing filler material. The joint filler must be flush with the adjacent concrete. A concave profile on the top of the joint filler is unacceptable and will be grounds for removal and replacement.

4) The Contractor shall protect the joints from damage caused by wheeled traffic or other sources during construction until a joint-filler material (if specified) has been installed.

2. Expansion Joints:

- a. Reinforcement or other embedded metal items bonded to the concrete shall not extend through expansion joints (except dowels in floors bonded on only one side of joints).
3. Installation of Embedded items
- a. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. Properly locate embedded items in cooperation with other trades and secure in position before concrete is poured.
 - b. Install inserts, dowels, reglets, hangers, metal ties, anchors, bolts, nailing strips, blocking, ground, and other fastening devices as required for attachment of other work.
 - c. Provide non-rusting sleeves for electrical conduits, pipes, and fittings that penetrate slabs, walls, or beams.
 - d. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain the required elevations and contours in the finished slab surface. Provide and secure units sufficiently strong to support the types of screed strips by the use of strike-off templates or accepted compacting type screeds.
 - e. Manholes, handholes, vaults and underground structures: Set and secure duct connectors in walls at required elevations and spacings.
 - f. Embedded Conduits and Fittings
 - 1) Conduits and fittings in concrete shall be subject to acceptance by the Engineer and shall be located such that they do not impair the strength of the concrete member. Conduits include pipes, ducts and electrical conduits. Conduits and fittings shall conform to the following, unless otherwise shown on the structural drawings:
 - a). Concrete walls:
 - (1). Conduits larger than 1-inch outside diameter shall not be embedded vertically in any wall. Conduits shall be spaced a minimum of 10 times the outside diameter of the conduit and shall be placed in the middle of the wall thickness.
 - (2). Conduits shall not be embedded horizontally in any wall, lengthwise.
 - (3). Conduits passing through wall shall not impair the strength of the wall and shall be provided with Schedule 40 galvanized steel pipe (ASTM A53) sleeve.
 - b). Concrete columns: Conduits shall not penetrate or be embedded in columns unless specifically approved by the Engineer.
 - c). Concrete beams:
 - (1). Vertical conduits larger than 1 inch outside diameter shall not be embedded vertically in any concrete beam. Conduits shall be spaced a minimum of 10 times the outside diameter and

shall be placed in the middle third of the beam thickness.

- (2). Conduits shall not be embedded horizontally in any beam, lengthwise.
 - (3). Conduits passing through beams shall not impair the strength of the beam and shall be provided with Schedule 40 galvanized steel pipe (ASTM 53) sleeve.
 - d). Suspended Concrete Slabs and Toppings:
 - (1) Conduits shall not be embedded in any slabs and toppings on metal decking and in toppings less than 3" thick.
 - (2) For other conditions, conduits larger than 1-inch outside diameter shall not be embedded in any concrete slab or topping. Conduits shall be spaced a minimum of 10 times the outside diameter and shall be placed in the middle third of the slab thickness. Conduit crossings shall be avoided.
 - (3) Conduits passing through slabs shall be provided with Schedule 40 galvanized steel pipe (ASTM A53) sleeve.
 - e). Concrete slabs on grade: Conduits shall not be embedded within the thickness of any concrete slabs on grade. Conduits may be placed below the bottom surface of slabs on grade and shall be spaced a minimum of 10 times the outside conduit diameter.
- 2) Where a number of conduits are intended to penetrate a structural member at a location which may unduly impair the strength of a member, such as near the surface of a beam or slab, the Engineer shall be informed and his approval must be obtained before the concrete is placed.
 - 3) Contractor shall coordinate the installation of all embedded items and penetrations. Cost of any added reinforcement required at pipe and conduit penetration and embedment shall be borne by the Contractor.

E. Placing and finishing formed concrete:

1. Preparation before placing:

- a. Sprinkle semi-porous subgrades sufficiently to eliminate suction of moisture from mix. Porous subgrades shall be sealed prior to concreting.
- b. Project manager review and approve formwork, reinforcement, etc. prior to commencement of concreting.

2. Conveying:
 - a. Conveying equipment conform to ASTM C 94.
 - b. Handle the concrete from the mixer to the place of final deposit as rapidly as practicable.
3. Placing Concrete:
 - a. Place concrete continuously, or in layers (24 inches thick or less) such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
 - b. If a section cannot be placed continuously, construction joints shall be located as approved (30 foot on center max.).
4. Segregation:
 - a. Concrete shall not be allowed to free fall over six (6) feet.
 - b. Concrete be deposited as near as possible to its final position to avoid segregation due to rehandling or flowing.
5. Consolidation:
 - a. All concrete shall be consolidated by vibration. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively.
 - b. Use of vibrators to transport concrete within forms shall not be allowed.
 - c. Vibrators shall be inserted and withdrawn at points approx. 18 inches apart. The duration at each insertion point shall be sufficient to consolidate concrete without segregation (generally 5 to 15 seconds).
 - d. A spare working vibrator shall be kept close at hand during all concrete placing operations.
 - e. Do not vibrate forms of steel.
6. Bonding:
 - a. Apply a bonding adhesive when necessary to enhance the bond between hardened concrete and new concrete if specified by ENGINEER.
 - b. Clean and dampen hardened concrete surfaces to receive fresh concrete.
7. Perform the following operations:
 - a. Repair of defective surface areas: Surface defects shall be repaired immediately after form removal.
 - b. All honey-combed and other defective concrete shall be removed down to sound concrete. The edges of the repair area shall be perpendicular to the surface area and slightly undercut. No featheredge will be permitted.

F. Placing and finishing slabs:

1. Preparation of subgrade for slabs on grade: Keep subgrade moist but do not allow standing water, mud or soft spots. If temperature where concrete is to be placed is below 50° F, enclose and heat to maintain temperature above 50° F long enough to remove frost from subgrade.
2. Concrete mixing and placing with finishing: Spread and finish concrete before bleeding water has an opportunity to collect on the surface.
3. Locate joints in slabs as indicated: Schedule saw cutting with the set of the concrete to eliminate raveling during sawing and before shrinkage cracks develop.

G. Curing and Protection: Begin curing operations immediately after placement. Protect concrete from premature drying, excessively hot or cold temperatures, mechanical injury or vandalism.

H. Guarantee: CONTRACTOR shall furnish the Owner with a written two (2) year guarantee for concrete materials and workmanship, including material and labor for total removal and replacement. The CONTRACTOR shall immediately place in satisfactory condition in every particular, any such guaranteed work upon written notice from the project manager and make good all damage to the buildings and grounds caused by said work, without cost to the Owner. All guarantees shall start from the date of written substantial completion.

3.6 CONCRETE CLEANUP

- A. Pay particular attention to project cleanup.
- B. Daily cleanup, weekly cleanup and job completion cleanup responsibilities to remove garbage, rubbish and unused materials are required.
- C. Coordinate school maintenance department for final project cleanup.
- D. Particular attention shall be placed on cleanup of areas subject to daily School activity. Construction activity shall be coordinated with school maintenance department to reduce congestion or interruption of school activity.

3.7 CONCRETE RESURFACING

A. Resurfacing Requirements:

1. Density of 96% of adjacent soil.
2. Saw-cut all existing surfaces at excavations to an absolute minimum width necessary for construction activity.
3. Types of roadway surfaces shall be shown for gravel, bituminous and concrete surfaces. Gravel surfaces shall match existing gravel thickness. New asphalt thickness shall match existing thickness plus 1 inch, but must be a minimum of 3 inches and maximum of 6 inches. Concrete surfaces shall match existing thickness.

3.8 CONCRETE REHABILITATION

- A. Requirements for repair of existing concrete, patching or repair of damaged concrete by use of epoxy resin or concrete ingredient compounds. Information shall include cleaning of concrete surfaces; application of bonding agent and cement paste filler; and application of epoxy adhesive and fillers.
- B. Materials:
1. Epoxy Resins: Bond Strength - 2700 psi - ASTM C882. Tensile Strength - 6600 psi - ASTM C638. Elongation - 2% at 7-day at 70 degrees F. - ASTM C638. Compressive Strength - 6500 psi - ASTM D695.
 2. Bonding Agent: Polyvinyl Acetate.
 3. Portland Cement: ASTM 150, Gray color.
 4. Sand: Clean, uniformly graded, ASTM C33 or ASTM C404.
 5. Cleaning agent: Commercial muriatic acid.

3.9 JOINTS AND JOINT SEALING

- A. Steel edging and jointing tools are acceptable. Preferred are magnesium, aluminum or wood tools
- B. Pavement joint sealing, Section 07 92 00.

3.10 CONSOLIDATION

- A. Keep spare vibrator available during concrete placement operations, ACI 309R.

3.11 FINISHING

- A. Section 03 35 00 and as follows:

Table 1 – Finishes

Type of work	Type of finish
Sidewalks, garage floors, ramps, exterior concrete	Broom or Smooth finish
Exterior platforms, steps, and landings, exterior and interior pedestrian ramps, not covered by other finish materials	Non-slip finish
Surfaces intended to receive bonded applied cementitious applications	Scratched finish
Surfaces intended to receive roofing, except future floors, waterproofing membranes, and roof surfaces that are	Floated finish
Floors and roof surfaces that are floors intended as walking surfaces to receive	Troweled
Unpainted concrete surfaces not exposed to public view	Rough as-cast form finish
Unpainted concrete surfaces exposed to public view	Smooth as-cast form finish

Concrete surfaces to receive paint	Grout cleaned finish
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3.12 CURING

- A. Section 03 39 00. Use a membrane forming compound unless specified otherwise.

3.13 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel- troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor rods for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Grout base plates and foundations as indicated, using specified non-shrink, non-metallic grout. Use high- flow grout where high fluidity and/or increased placing time are required. This grout shall be used for all base plates larger than 10 square feet.
- E. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp and finish concrete surfaces as scheduled.
- F. Installation of adhesive anchors using injectable epoxy or adhesive: A representative of the adhesive manufacturer shall be present for the first day that adhesive anchors are installed. After drilling the hole to the diameter and depth recommended by the manufacturer, clean the hole with a wire or nylon brush. Blow the dust out of the hole using compressed air with a nozzle that reaches to the bottom of the hole. When using adhesive from a new pack, the adhesive that is discharged from the mixing nozzle should be a uniform gray color before any adhesive is installed in the hole. Fill the hole with adhesive starting from the very bottom of the hole until the hole is about 2/3 full. Do not leave an air pocket at the bottom of the hole. Insert the anchor rod or dowel by slowly twisting it into the hole.

3.14 PROTECTION AND REPAIR

- A. Protection:
1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, graffiti, and mechanical injury.
 2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

B. Repair:

1. Modify or replace concrete not conforming to required levels, lines, details, and elevations.
 - a. Formed Surfaces: Concrete surfaces requiring repairs shall include all cracks in excess of 0.01" and any other defects that affect the durability or structural integrity of the concrete. Voids, including honeycombing and rock pockets, and tie holes shall be repaired as required by the specified Surface Finish.
 - b. Unformed Surfaces: Concrete surfaces requiring repair shall include all surface defects such as crazing, cracks in excess of 0.01" wide or cracks which penetrate to reinforcement or through the member, popouts, spalling and honeycombs.
2. Classification:
 - a. Structural Concrete Repair: Major defective areas in concrete members that are load carrying (such as shear walls, beams, joists and slabs), are highly stressed, and are vital to the structural integrity of the structure shall require structural repairs. Structural concrete repairs shall be made using a two-part epoxy bonder, epoxy mortar or specified polymer repair mortar. The Engineer shall determine the locations of required structural concrete repairs.
 - b. Cosmetic Concrete Repair: Defective areas in concrete members that are nonload carrying and minor defective areas in load carrying concrete members shall require cosmetic concrete repair when exposed to view and not covered up by architectural finishes. Cosmetic concrete repairs may be made using a polymer repair mortar and compatible bonding agent. The Architect/Engineer shall determine the locations of required cosmetic concrete repairs. Stains and other discolorations that cannot be removed by cleaning and are exposed to view will require cosmetic repair. Cosmetic concrete repair in exposed-to-view surfaces will require Architect's approval prior to patching operation.
 - c. Slab Repairs: High and low areas in concrete slabs shall be repaired by removing and replacing defective slab areas unless an alternate method, such as grinding and/or filling with self-leveling underlayment compound or repair mortar is approved by the Architect/Engineer. Repair of slab spalls and other surface defects shall be made using epoxy products as specified above and as determined by the Engineer. The high strength flowing repair mortar may be used for areas greater than 1 inch in depth.
3. Structural analysis and additional testing may be required at no additional cost to OWNER when the strength of a structure is considered potentially deficient.
4. To patch imperfections, refer to Section 03 35 00 requirements.
5. Remove graffiti and mechanical injury.

END OF SECTION

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SECTION 03 39 00
CONCRETE CURNG

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Concrete curing requirements.

1.3 REFERENCES

(Current Edition at Date of Bid)

- A. ACI 301: Specifications for Structural Concrete for Buildings
- B. ACI 305: Hot Weather Concreting.
- C. ACI 306: Cold Weather Concreting
- D. ASTM C 171: Standard Specification for Sheet Materials for Curing Concrete.
- E. ASTM C 1315: Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.4 SUBMITTALS

- A. Curing agent data sheet.
- B. Curing plan. Describe estimated cure quantity and procedure.
- C. Manufacturer certificates, Section 01 33 00 that shows product meets performance criteria.
- D. Manufacturer's recommended installation procedures which, when accepted by ENGINEER, will become the basis for accepting or rejecting installed product.

1.5 QUALITY ASSURANCE

- A. Use workers knowledgeable of ACI 301, 305, 306.

1.6 PRODUCT HANDLING

- A. Protect materials of this section before, during, and after installation.
- B. Protect the work and materials of other trades.
- C. In the event of damage, immediately make replacements and repair at no additional cost to Owner.

1.7 WEATHER LIMITATIONS

- A. Above 75 deg. F., ACI 305
- B. Below 55 deg. F., ACI 306.

PART 2 - PRODUCTS

2.1 COVERS

- A. Water or Fog-spay: Clean, non-staining and non-detrimental to concrete.
- B. Sheet Coverings: White waterproof paper, polyethylene film, or polyethylene coated burlap sheet complying with ASTM C 171.
- C. Mat Coverings: Clean roll goods of cotton or burlap fabric. D. Insulating Coverings: Non-staining curing blankets.

2.2 MEMBRANE FORMING COMPOUND

- A. Material.
 - 1. Styrene-acrylic.
 - 2. Styrene-butadiene.
 - 3. Alpha-methylstyrene.
- B. Performance Criteria: ASTM C 1315 compound.
 - 1. Type ID Class A (clear with fugitive dye), or
 - 2. Type II Class A or B (white pigmented).
- C. Volatile Organic Compounds (VOC): Comply with local, state and federal requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not use membrane forming curing compound on surfaces that are to receive hardeners.
- B. Commence curing operation within 20 minutes after finishing.
- C. Do not allow vehicular traffic on newly paved areas until concrete has reached 90% of design concrete strength.

3.2 APPLICATION

- A. General:
 - 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete. Limit moisture loss to a maximum of 0.05 lb. /sq. ft - hr for concrete containing silica fume and 0.2 lb. /sq. ft. - hr for all other concrete before and during finishing operations. If using an evaporation retarder, apply in accordance

with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be 7 days for all concrete except high early strength concrete which shall be cured for 3 days minimum.

Alternatively, curing times may be reduced if either of the following provisions is complied with:

- a. If tests are made of cylinders kept adjacent to the structure and cured by the same methods, curing measures may be terminated when the average compressive strength has reached 70% of the specified 28 day compressive strength.
 - b. If the temperature of the concrete is maintained at a minimum of 50°F for the same length of time required for laboratory cured cylinders of the same concrete to reach 85% of the 28 day compressive strength, then curing may be terminated thereafter.
3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period.

- B. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by one or a combination of the methods specified below, as applicable.

1. Columns and shearwalls that are not exposed to view: Moist cure in forms or by one or a combination of methods 1, 2, or 3 specified below. Use a high –solids, liquid membrane-forming curing and sealing compound conforming to ASTM C 1315, type I, Class A or B for method 3.
2. Columns and shearwalls that are exposed to view: Moist cure in forms or by one or a combination of methods 1, 2 or 3 specified below. Use a high-solids, nonyellowing, liquid membrane-forming curing and sealing compound conforming to ASTM C 1315, type 1, class A for method 3.
3. Sides and Soffits of Beams and Pan-Joist Ribs, Soffits of Slabs: Moist cure in forms or by one or a combination of methods 1, 2 or 3 specified below. Use a liquid membrane-forming dissipating resin curing compound conforming to ASTM C 309, type 1, class A or B for method 3.
4. Basement Walls, Sides of Exterior Retaining Walls: Moist cure in forms or by one or a combination of methods 1, 2 or 3 specified below. Use a liquid membrane forming dissipating resin curing compound conforming to ASTM C 309, type 1, class A or B for method 3.

- C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping and other flat surfaces by one or a combination of the methods specified below, as applicable. The Contractor shall choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Ramps and Horizontal Surfaces of Parking Areas, Exposed Exterior Balconies: Cure using only methods 1 or 2 as specified below.
2. Floors Directly Exposed to Vehicular or Foot Traffic not in Parking Areas and not otherwise receiving a chemical hardener or penetrating sealer finish: Apply two coats of a high-solids, water-based, non-yellowing, liquid membrane-forming

- curing and sealing compound conforming to ASTM C 1315, type 1, Class A in accordance with method 3 as specified below.
3. Floors in Non-Public spaces that are left exposed to view and not receiving sealers or hardeners, floors involved in under-floor air distribution systems: Apply one coat of a high-solids, water-based, non-yellowing, liquid membrane forming curing and sealing compound conforming to ASTM C 1315, type 1, Class A or B in accordance with method 3 as specified below.
 4. Floors that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile, acrylic terrazzo, vinyl composition tile, sheet vinyl, linoleum, vinyl backed carpet, rubber, athletic flooring, synthetic turf, wood, epoxy overlay or adhesive, or other coating or finishing products: Cure using methods 2 or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C 309, type 1, class A or B for method 3.
 5. Industrial Slabs: Cure using methods 1 or 2 as specified below for 7 days. The temperature of applied water shall be with 10° F of concrete surface temperature.
 6. All Other Surfaces: Cure using methods 1, 2 or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C 309, type 1, class A or B for method 3.

D. Curing Methods:

1. Method 1 - Moisture Curing: Provide moisture curing by one of the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
2. Method 2 - Moisture-Retaining Cover Curing: Provide moisture-retaining cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Water may be added to concrete surface to prevent drying before the cover is installed, but the surface shall not be flooded with water if a non-absorptive cover is used.
3. Method 3 – Curing or Curing and Sealing Compound: Provide curing, curing/hardener, liquid membrane-forming curing, or curing and sealing compound as follows:
 - a. Apply specified compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Do not allow to puddle. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Apply second coat for sealing 2 to 3 hours after the first coat was applied.
4. Do not use membrane-forming curing and sealing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor

hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glued-down carpet, vinyl composition tile, linoleum, sheet vinyl, rubber, athletic flooring, synthetic turf, or wood), paint or other coatings and finish materials. Dissipating resin type cures are acceptable in these locations.

3.3 CONCRETE CURE TEMPERATURE

- A. During cure period, eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete.

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SECTION 07 92 00
JOINT SEALANTS

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. Sealants and caulking of all new exterior and interior joints as indicated and as required to maintain total waterproof integrity of joints.
 - 2. Acoustical joint sealants.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Product test reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.5 WARRANTY

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

- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

- 1. Warranty Period: 10 years from date of Substantial Completion.

1.6 MOCK-UP

- A. Provide mock-up of sealant joints.
- B. Construct mock-up with specified sealant types.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.7 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material ASTM C 920:
 - 1. Type: Single component (S), Multicomponent(M)
 - 2. Grade: Nonsag (NS), Pourable(P)
 - 3. Class: 12.5, 25, 35, 50, 100/50.
 - 4. Uses Related to Exposure: Nontraffic (NT), Traffic (T), Immersible(I)
 - 5. Use Related to Material:
 - a. M: Sealants used in contact with mortar
 - b. G: Sealants used in contact with glass
 - c. A: Sealants used in contact with aluminum
 - d. O: Sealants used in contact with all other materials other than those listed in a, b, c above.
- B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint- sealant manufacturer, based on testing and field experience.
- C. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

- D. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid- applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- F. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- G. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Neutral-Curing Silicone Joint Sealant: ASTM C920.
 - 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. BASF Building Systems.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. Pecora Corporation.
 - e. Tremco Incorporated.
- B. Acid Curing Silicone Joint Sealant: ASTM C920.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ADFAST, Inc.; Adseal 4800 Series or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. Pecora Corporation.
 - e. Tremco Incorporated.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Nonstaining, neutral-curing silicone joint sealant; ASTM C 920.

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. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - b. Pecora Corporation.
 - c. Sika Corporation; Joint Sealants.
 - d. Tremco Incorporated.

2.4 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C920.

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. BASF Corporation; Construction Systems.
 - b. Bostik, Inc.
 - c. ER Systems; an ITW Company.
 - d. Pecora Corporation.
 - e. Polymeric Systems, Inc.
 - f. Schnee-Morehead, Inc., an ITW company.
 - g. Sherwin-Williams Company (The).
 - h. Sika Corporation; Joint Sealants.
 - i. Tremco Incorporated.

2.5 IMMERSIBLE JOINT SEALANTS

- A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 2(25); tested in deionized water unless otherwise indicated.

2.6 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. STEP sealant: ASTM C920.

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. BASF Corporation; Construction Systems.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Pecora Corporation.
 - d. Sherwin-Williams Company (The).
 - e. Sika Corporation; Joint Sealants.

2.7 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- 1. Silicone: Mildew Resistant, Acid Curing, S, NS, 25, NT.
 - 2. STPE: Mildew Resistant, S, NS, 50, NT

2.8 POLYSULFIDE JOINT SEALANTS

- A. Polysulfide joint sealant: ASTM C920.

- 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. W. R. Meadows, Inc.

2.9 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

- 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. Bostik, Inc.
 - b. Pecora Corporation.

2.10 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide ADFAST, Inc.; Adseal 1090 Series or comparable product by one of the following:
 - a. BASF Building Systems.
 - b. Bostik, Inc.
 - c. Pecora Corporation.
 - d. Tremco Incorporated.

2.11 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

2.12 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound

transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

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. Pecora Corporation; AC-20 FTR.
 - b. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - c. USG Corporation; SHEETROCK Acoustical Sealant.
2. Apply acoustical joint sealants where indicated and as specified in other Division 09 Sections.

2.13 JOINT SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 1. 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. Alcot Plastics Ltd.
 - b. BASF Corporation; Construction Systems.
 - c. Construction Foam Products; a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.14 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure BA in ASTM C1193, unless otherwise indicated.
- F. Acoustical Sealant Installation: Comply with ASTM C919 and with manufacturer's written recommendations.
- G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 CURING

- A. Cure sealants in accordance with manufacturer's printed instructions to obtain high early bond strength, internal cohesive strength, and durability.
- B. If finished sealant has bubbles or other defects, replace sealant and backing.

3.4 PROTECTION AND CLEANING

- A. Protect adjacent surfaces against stains, smears, and other damage during the sealant application.
- B. Immediately clean and remove droppings, smears, and other soiling caused by sealant application. Use solvents and cleaning agents recommended by sealant manufacturer. Use in accordance with solvent and cleaning agent manufacturer's instructions. Leave no stain, damage, or discoloration on surfaces.

3.5 SCHEDULE

A. Exterior Joints:

1. Joints in vertical surfaces and horizontal nontraffic surfaces:

a. Joint Locations:

- 1) Construction joints in cast-in-place concrete.
- 2) Joints between plant-precast architectural concrete units.
- 3) Control and expansion joints in unit masonry.
- 4) Joints in dimension stone cladding.
- 5) Joints in glass unit masonry assemblies.
- 6) Joints in exterior insulation and finish systems.
- 7) Joints between metal panels.
- 8) Joints between different materials listed above.
- 9) Perimeter joints between materials listed above and frames of doors windows and louvers.
- 10) Control and expansion joints in ceilings and other overhead surfaces.
- 11) Other joints as indicated.

- b. Silicone: nonstaining, S, NS, 50, NT; Urethane: M, NS, 50, NT.
- c. Color: To match adjacent material.

2. Joints in horizontal surfaces subject to traffic:

a. Joint Locations:

- 1) Control and expansion joints in brick pavers.
- 2) Isolation and contraction joints in cast-in-place concrete slabs.
- 3) Joints between plant-precast architectural concrete paving units.
- 4) Joints in stone paving units, including steps.
- 5) Tile control and expansion joints.
- 6) Joints between different materials listed above.
- 7) Other joints as indicated.

- b. Urethane: M, P, 50, T.
- c. Color: To match adjacent material.

3. Joints in horizontal traffic surfaces subject to water immersion:

a. Joint Locations:

- 1) Joints in pedestrian plazas.
- 2) Joints in swimming pool decks.
- 3) Other joints as indicated on Drawings.

- b. Urethane: S, P, 25, I.
- c. Color: To match adjacent material.

4. Joints at glazed openings to be in accordance with recommendation of glazing and frame manufacturers and as follows:

- a. One-Part Nonacidic Curing Silicone Sealant.

B. Interior Joints:

1. Joints in vertical surfaces and horizontal nontraffic surfaces, except in areas exposed to moisture:

a. Joint Locations:

- 1) Expansion joints on exposed interior surfaces of exterior walls.
- 2) Perimeter joints of exterior openings where indicated.
- 3) Tile control and expansion joints.
- 4) Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.
- 5) Joints on underside of plant-precast structural concrete beams and planks.
- 6) Other joints as indicated.

- b. Urethane: S, NS, 25, NT.
- c. Color: To match adjacent material.

2. Joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement:
 - a. Joint Locations:
 - 1) Control joints on exposed interior surfaces of exterior walls.
 - 2) Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - 3) Other joints as indicated on Drawings.
 - b. Acrylic latex
 - c. Color: To match adjacent material.
3. Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - a. Joint Locations:
 - 1) Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 2) Tile control and expansion joints where indicated.
 - 3) Joints exposed to moisture.
 - 4) Other joints as indicated on Drawings.
 - b. Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 - c. Color: To match adjacent material.
4. Joints in horizontal surfaces subject to traffic:
 - a. Joint Locations:
 - 1) Isolation joints in cast-in-place concrete slabs.
 - 2) Control and expansion joints in stone flooring.
 - 3) Control and expansion joints in brick flooring.
 - 4) Control and expansion joints in tile flooring.
 - 5) Other joints as indicated.
 - b. Urethane: S, P, 25, T.
 - c. Color: To match adjacent material.
5. Joint-Sealant Application: Concealed mastics:
 - a. Joint Locations:
 - 1) Aluminum thresholds.
 - 2) Sill plates.
 - 3) Other joints as indicated on Drawings.
 - b. Joint Sealant: Butyl-rubber based
 - c. Color: As selected by Architect from manufacturer's full range of colors.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 08 Section "Door Hardware".
3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

12. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
13. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
14. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).
 - 2. Curries Company (CU).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
 - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
 - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Manufacturers Basis of Design:
 - 1. Curries Company (CU) - Polystyrene Core - 707 Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.

3. Manufacturers Basis of Design:

a. Curries Company (CU) – M Series.

- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
4. Storm Shelter Anchors: Masonry T-shaped, wire masonry type, or existing opening type anchors as per manufacturers listing or anchor detail sheets including welded installation methods.

- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LOUVERS

- A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.

1. Solid metal panel in place of blade louvers to be supplied and installed.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.7 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed

independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
 - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
 - 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
 - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
10. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 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. This Section includes commercial door hardware for the following:
1. Swinging doors.
 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
1. Mechanical door hardware.
 2. Cylinders specified for doors in other sections.
- C. Related Sections:
1. Division 08 Section "Hollow Metal Doors and Frames".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 2. ICC/IBC - International Building Code.
 3. NFPA 70 - National Electrical Code.
 4. NFPA 80 - Fire Doors and Windows.
 5. NFPA 101 - Life Safety Code.
 6. NFPA 105 - Installation of Smoke Door Assemblies.
 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.
 4. UL 305 - Panic Hardware.
 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third-party source will not be accepted.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including

2. electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 3. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 4. Review sequence of operation narratives for each unique access controlled opening.
 5. Review and finalize construction schedule and verify availability of materials.
 6. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site with- out prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
1. Ten years for mortise locks and latches.
 2. Five years for exit hardware.
 3. Twenty-five years for manual overhead door closer bodies.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.

- c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
- 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
- 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - c. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
- 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
- 5. Manufacturers:
 - a. McKinney (MK).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 - 1. Manufacturers:
 - a. Pemko (PE).

2.3 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

2. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
3. Manufacturers:
 - a. Rockwood (RO).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trimring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Manufacturer's Standard.
- D. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
 2. Manufacturers:
 - a. Corbin Russwin (RU) - Access 3 AP.
 - b. Sargent (SA) - Degree DG1.
- F. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. New System: Key locks to a new key system as directed by the Owner.

- G. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- H. Construction Keying: Provide construction master keyed cylinders.
- I. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - 1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
 - 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
- B. Multi-Point Locksets, FEMA: ANSI/BHMA A156.37, Certified Products Directory (CPD) listed three-point locking system device engineered for in-swinging and out-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bot- tom and center latch positions. All three latching points are automatically activated when the device is locked. Multi-Point Deadlocking System shall be used only with doors, frames and associated hardware that have been engineered, tested and approved for a complete opening assembly system.
 - 1. Severe Storm Shelter Components: Multi-point locking system devices engineered for in-swinging and out-swinging door applications on tornado or hurricane resistant safe shelter rooms. The multi-point latching integrated device is approved

- for usage as part of a complete ICC 500 (2014) and FEMA P-361 (2015) door, frame and hardware assembly.
2. ANSI-BHMA listed to A156.37 Grade 1 for multi-point locks:
 - a. Lever torque to retract all bolts less than 28 in.lb.
 - b. Cycle tested to 1,000,000 cycles.
 3. NFPA 80 and NFPA 101 life safety requirements.
 4. UL10B or UL10C, 3-hour fire rated openings.
 5. Latchbolt Construction:
 - a. Center Bolt to be one piece, $\frac{3}{4}$ " throw anti-friction stainless steel latch and one piece, 1" throw, hardened stainless steel deadbolt; 2-3/4" standard backset.
 - b. Top and Bottom Bolts to be $\frac{3}{4}$ " x $\frac{3}{4}$ " stainless steel square latchbolt with $\frac{3}{4}$ " projection.
 6. Independent top and bottom bolt projection shall be field adjustable:
 - a. From the center mortise pocket.
 - b. Ability to make field adjustments while the door is in the hung position without the removal of the door.
 - c. Top and Bottom Bolts and the Center Mortise Case shall be factory installed into the door assembly.
 7. Bottom strike shall be offset and reversible to accommodate alignment issues due to rough opening tolerances.
 8. Devices must be able to accommodate sectional rose and lever trim to match the design style and architectural finishes of the balance of the lockset and latches as specified.
 9. Devices must be available with electronic access control options for higher or everyday use and traceability.
 10. Devices must be available with rod-dogging indicator options:
 - a. Operated by single-point latching for non-emergency or normal use of the space.
 - b. Ability to hold rods in a retracted state.
 - c. Day-to-day operations with mortise lock only.
 - d. Indicator to show status.
 11. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - FE6600 Series.
 - b. Sargent Manufacturing (SA) - FM7300 Series.

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dustproof strikes where thermal pins are required to project into the floor.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.

2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
 7. Tornado Resistance Compliance: Door closers to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC8000 Series.
 - b. Norton Rixson (NO) - 9500 Series.

- c. Sargent Manufacturing (SA) - 281 Series.
- C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
 - 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC8000 Series.
 - b. Norton Rixson (NO) - 7500 Series.
- D. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.
 - 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - Unitrol Series.
 - b. Norton Rixson (NO) - Unitrol Series.

2.10 ARCHITECTURAL TRIM

- A. Door Protective Trim
 - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 - 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
 - 4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, .050-inch thick.
 - 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
 - a. Manufacturers:
 - 1) Rockwood (RO).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Rockwood (RO).

2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Hurricane and Tornado Resistance Compliance: Architectural seals to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- G. Manufacturers:
 - 1. Pemko (PE).

2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.

- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guide- line only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handling and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

- B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. RU - Corbin Russwin
5. NO - Norton
6. OT - Other

3.9 HARDWARE SETS

Set: 1.0 - EXTERIOR HOLLOW METAL PAIR:

6	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Keyed Removable Mullion	KRM200		YA
1	Rim Exit Device, Storeroom	7100 AU627F	630	YA
1	Rim Exit Device, Exit Only	7100 EO	630	RU
2	Surface Closer	UNI7500	689	NO
2	Kick Plate	K1050 10" x 1" LDW CSK BEV	US32D	RO
2	Astragal	18041CNB TKSP8		PE
1	Gasketing	2891APK TKSP8		PE
1	Mullion Gasketing	5110BL		PE
2	Sweep	3452CNB TKSP8		PE
1	Threshold	253x3AFG		PE

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SECTION 09 91 00
PAINTING

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions 01 Specification sections apply to work of this section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior and exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Maximum 5 units at 60 degrees, according to ASTM D 523 (flat).
- B. Gloss Level 2: Maximum 10 units at 60 degrees, according to ASTM D 523 (velvet).
- C. Gloss Level 3: 10 to 25 units at 60 degrees, according to ASTM D 523 (eggshell).
- D. Gloss Level 4: 25 to 35 units at 60 degrees, according to ASTM D 523 (satin).
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523 (semigloss).
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523 (gloss).
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523 (high gloss).

1.4 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

3. Include above information in project closeout Operations and Maintenance manuals.

1.5 EXTRA MATERIALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 2 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum FIVE years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum THREE years' experience.

1.7 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide illustrating paint coating color, texture, and finish where directed by Architect/Owner.
- C. Mock-up may remain as part of the work.

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95° F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5° F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Company.
 - 2. Devoe Paint.
 - 3. Dunn-Edwards.
 - 4. ICI Paints.
 - 5. PPG Industries.
 - 6. Pratt & Lambert Paints
 - 7. Sherwin-Williams Company.
 - 8. Substitutions: see section 01 25 00 - Substitution Procedures.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Ready mixed, unless intended to be a field-catalyzed coating.
- C. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 5. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. VOC Content: Products shall comply with the most stringent VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Dry-Fog Coatings: 400 g/L.
 - 4. Primers, Sealers, and Undercoaters: 200 g/L.
 - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
 - a. Floor Coatings: 100 g/L.
 - b. Shellacs, Clear: 730 g/L.
 - c. Shellacs, Pigmented: 550 g/L.
- E. Low-Emitting Materials: Interior stains and finishes shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS/SEALERS

- A. General: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.4 PAINTS

- A. Exterior:
 1. Latex, Exterior Flat (Gloss Level 1): MPI #10.
 2. Latex, Exterior Low-Sheen (Gloss Level 3-4): MPI #15.
 3. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
 4. Latex, Exterior, Gloss (Gloss Level 6): MPI #119.
 5. Light Industrial Coating, Exterior, Water Based, Eggshell (Gloss Level 3): MPI #161.
 6. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): MPI #163.
 7. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.
- B. Interior:
 1. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
 2. Latex, Interior, Velvet, (Gloss Level 2): MPI #44.
 3. 2. Latex, Interior, Eggshell, (Gloss Level 3): MPI #52.
 4. Latex, Interior, Satin, (Gloss Level 4): MPI #43.
 5. Latex, Interior, Semi-Gloss (Gloss Level 5): MPI #54.
 6. Latex, Interior, Gloss (Gloss Level 6): MPI #114.
 7. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.
 8. Latex, Interior, Institutional Low Odor/VOC, Velvet (Gloss Level 2): MPI #144.
 9. Latex, Interior, Institutional Low Odor/VOC, Eggshell (Gloss Level 3): MPI #145.
 10. Latex, Interior, Institutional Low Odor/VOC, Satin (Gloss Level 4): MPI #146.
 11. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.
 12. Latex, Interior, Institutional Low Odor/VOC, Gloss (Gloss Level 6): MPI #148.
 13. Light Industrial Coating, Interior, Eggshell (Gloss level 3): MPI #151.
 14. Light Industrial Coating, Interior, Semi-Gloss (Gloss level 5): MPI #153.
 15. Light Industrial Coating, Interior, Gloss (Gloss level 6): MPI #154.

16. Epoxy High Built, interior, low gloss: MPI #108.

2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPIManual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.

- f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
- 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

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

3.6 EXTERIOR PAINTING SCHEDULE

- A. Not all listed paint schedules used, refer to drawings for sheen and paint surface location.
- B. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - b. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
- C. CMU Substrates:
 - 1. Latex System:
 - a. Prime Coat: Block filler, latex, interior/exterior, MPI #4.
 - b. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

2. Latex over Alkali-Resistant Primer System:
 - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - b. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
- D. Steel Substrates:
 1. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Shop primer specified in Section 05 12 00 "Structural Steel Framing" where substrate is specified.
 - b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163; or Gloss (Gloss Level 6): MPI #164.
 2. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, Alkyd for metal, MPI # 107.
 - b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163; or Gloss (Gloss Level 6): MPI #164.
- E. Galvanized-Metal Substrates:
 1. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.
- F. Wood Substrates: Including wood trim doors.
 1. Latex System:
 - a. Prime Coat: Primer, latex for exterior wood, MPI #6.
 - b. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11; or Gloss (Gloss level 6), MPI # 119.
- G. Exterior Gypsum Board Substrates:
 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

3.7 INTERIOR PAINTING SCHEDULE

- A. Not all listed paint schedules used refer to drawings for sheen and paint surface location.
- B. Concrete Substrates:
 1. Non-traffic Surfaces: Institutional Low-Odor/VOC Latex System

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- 2. Traffic Surfaces: Epoxy High Built
 - a. Epoxy High Built, interior, low gloss: MPI #108.
- C. CMU Substrates:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 3), MPI #145.
- D. Steel Substrates:
 - 1. Latex over Alkyd Primer System:
 - a. Prime Coat: Shop primer specified in Section 05 12 00 "Structural Steel Framing" where substrate is specified.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss (Gloss Level 5), MPI #54; or Latex, Interior, Gloss (Gloss Level 6): MPI # 114.
 - 2. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147; or Gloss (Gloss Level 6): MPI #148.
- E. Galvanized-Metal Substrates:
 - 1. Latex over Waterborne Primer System:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss (Gloss Level 5), MPI #54.
- F. Wood Substrates: Including wood trim doors wood-based panel products.
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.

- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147; or Gloss (Gloss Level 6): MPI #148.
- G. Gypsum Board or Plaster Substrates:
 - 1. Use anti-microbial paint at kitchen, restrooms, and janitor rooms.
 - 2. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1), MPI #143; eggshell (Gloss Level 3), MPI #145; or semi-gloss (Gloss Level 5), MPI #147.
- H. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat (Gloss Level 1), MPI #53.
- I. Existing Glazing Tile (Room E126, E127, E128)
 - 1. Tile Preparation:
 - a. Deep clean the glazed tile and grout. Remove all dirt, oil, wax, grease, mold, etc.
 - b. Repair or replace any broken tile or bad grout.
 - c. Sand the entire surface using 400-grit sandpaper to remove gloss and smooth the tile.
 - d. Clean the wall using a damp rag to get all of the dust from the sanding off of the wall. Allow the wall to dry completely.
 - 2. Light Industrial Coating System:
 - a. Prime Coat: Primer, Bonding, Water based, MPI #17.
 - b. Intermediate Coat: Alkyd, interior, matching topcoat.
 - c. Topcoat: Alkyd, interior, eggshell (Gloss Level 3), MPI #151.

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SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

- A. The General Conditions, Supplementary General Conditions, General Requirements, and Special Conditions shall be and are hereby made a part of this Section of the specifications.
- B. In case of conflicts between the electrical drawings and Division 26 of these specifications, the more stringent requirements shall govern. In all cases, notify the Engineer for direction.
- C. The requirements of COMMON WORK RESULTS FOR ELECTRICAL establish minimum requirements, apply to, and are hereby made a part of all sections of Division 26, 27, and 28 of this specification.
- D. The Contractor shall be responsible for excavation of all earth, soil, and rock conditions at the site. Review the elevations and soil boring logs and include all associated costs.

1.2 DESCRIPTION:

- A. The electrical work shall include all labor, materials, tools, transportation, equipment, services and facilities, required for the complete, proper and substantial installation of all electrical work shown on the plans, and/or outlined in these specifications. The installation shall include all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings but which are necessary to make a complete working installation of all electrical systems.
- B. All of the electrical related work required for this project (unless specified otherwise) is a part of the Electrical Contract price but is not necessarily specified under this division of the specifications or shown on the electrical drawings. Therefore, all divisions of the specifications and all drawings shall be consulted.
- C. The plan drawings are schematic only and are not intended to show the exact routing of raceway systems unless dimensions are noted on the drawings. Final routing will be governed by field conditions (structural members, mechanical equipment, ductwork, underground piping, duct banks, etc.) and shall be determined by the Contractor and approved by the Architect. Any changes in routing shall not change the design of the raceway system.
- D. The plan drawings showing device and equipment locations are schematic only and are not intended to show exact locations unless dimensions are noted on the drawings. The Contractor shall review all contract drawings that may affect the location of devices and equipment to avoid possible interference and permit full coordination of all work. The right to make any reasonable change in location within 6'-0", is reserved by the Architect up until the time of rough-in at no extra cost.
- E. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of transformers, cable,

switchgear, panelboards, motor control, and other items, arrangement for specified items in general are shown on drawings.

- F. Electrical service entrance equipment (arrangements for temporary and permanent connections to the power company's system) shall conform to the power company's requirements. Coordinate fuses, circuit breakers and relays with the power company's system, and obtain power company approval. Provide all required temporary building power and lighting. Remove when finished. Installation of temporary power and lighting shall comply with N.E.C. and OSHA requirements.
- G. Ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized.

1.3 MINIMUM REQUIREMENTS:

- A. Codes Rules and Regulations: Execute all work under ADA, the latest rules and regulations of the National Electrical Code (NEC), the National Fire Protection Association, and with all laws, regulations and ordinances of the County, State, City, and the Utility Company.
- B. Codes shall govern in case of any direct conflict between codes, plans and specifications; except when plans and specifications require higher standards than those required by code. Variance from the plan and specifications made to comply with code must be approved by the Architect. If approved they shall be made with no increased cost to the Owner.

1.4 STANDARDS:

- A. All material and equipment shall be listed, labeled or certified by UL LLC, where such standards have been established. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:
 - 1. Certified: Equipment is "certified" if:
 - a. Equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards, or to be safe for use in a specified manner.
 - b. Production is periodically inspected by a nationally recognized testing laboratory.
 - c. It bears a label, tag, or other record of certification.
 - 2. Nationally recognized testing laboratory: A testing laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.5 QUALIFICATIONS (PRODUCTS AND SERVICES):

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
 - 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 - 2. The Engineer reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will respond within four hours of receipt of notification that service is needed. Submit name and address of service organization.

1.6 MANUFACTURED PRODUCTS:

- A. Materials and equipment furnished shall be new, of best quality and design, free from defects, of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts should be available. All items used on this project shall be free of asbestos, PCB, and mercury material.
- B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer unless indicated otherwise.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall be completely responsible for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory and Field wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The Contractor shall notify the Engineer a minimum of 15 working days prior to the manufacturer making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and reinspection is required, the Contractor shall be liable for all additional expenses, including expenses of the Engineer.

1.7 EQUIPMENT PROTECTION:

- A. Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain.
- B. During installation, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing, operating and painting.
- C. Damaged equipment shall be, as determined by the Engineer, placed in satisfactory operating condition or be returned to the source of supply for repair or replacement.
- D. Painted surfaces shall be protected with factory installed removable heavy Kraft paper, sheet vinyl or equal.
- E. Damaged paint on equipment and materials shall be restored to the original quality of paint and workmanship as used by the manufacturer so repaired area is not obvious.

1.8 GENERAL WORK REQUIREMENTS:

- A. Arrange, phase and perform work to assure electrical service both temporary and permanent for buildings at all times.
- B. Coordinate location of equipment and conduit with other trades to minimize interferences.
- C. Examination of Site:
 - 1. Visit the site, inspect the existing conditions and check the drawings and specifications so as to be fully informed of the requirements for completion of the work.
 - 2. Lack of such information shall not justify an extra to the contract price.
- D. Permits:
 - 1. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the execution of this work.
 - 2. Pay fees and charges for connection to outside services and use of property.
 - 3. Deliver permits and certificates to the Architect to be transmitted to the Owner.
- E. Services:
 - 1. This Contractor shall pay for all expenses, deposits, reimbursements, etc., required by the local rules and codes for the service to the buildings, complete and ready for use. See plot plan.
 - 2. Consult Power Company for their requirements and for coordinating with their installation. Contractor shall provide any work thus required beyond that indicated by the drawings and specifications. He shall bear all expense involved for the complete installation of the electrical service (both temporary and permanent) to the building ready for operation, including utility service charges, except as specifically excluded on the plans.
 - 3. This Contractor shall consult all local departments to verify requirements and bid installation of service in accordance with local codes and Utility company rules and regulations.

4. This Contractor shall bear all expense involved for the complete telephone and internet service conduit installation and pull wire ready for cable installation. Verify complete installation with the local telephone company and internet service provider and bid installation to comply with their requirements.

F. Responsibility:

1. This Contractor will be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through this contractor's operation.
2. Any mutilation of building finishes or equipment initiated by electrical construction shall be properly corrected by the respective finishing contractor and paid for by the Electrical Contractor.
3. The operation of the temporary power and the permanent electrical system shall be the responsibility of this Contractor until acceptance of the building by the Owner.

G. Work to be done by General Contractor:

1. Build in all openings, sleeves, chases, etc., for conduit and equipment as established, furnished and set by this Contractor. The General Contractor shall seal or grout all openings after this Contractor has installed the conduits.
2. Build in bolts, brackets, hangers etc., for work established, furnished and set by this Contractor.
3. All concrete work required for equipment furnished and set by this Contractor including clean up pads under electrical gear, fixture bases, transformer bases, etc.
4. Painting: All painting of electrical equipment installed in finished areas shall be done by the General Contractor. Painting will not be required on receptacles, switches, circuit breakers etc. All fixtures and exterior poles specified to be factory-primed shall be painted by General Contractor. Paint all wiremold, exposed conduit and equipment, etc., to match final wall colors.
5. Provide fireproofing above fixtures located in fire rated ceilings per U.L. requirements.
6. Pay all utility costs for operation of electrical system during construction until acceptance of building by the Owner.

H. Work done by the Mechanical Contractor:

1. The Mechanical Contractor shall furnish wiring diagrams and temperature control drawings of all equipment furnished to the Electrical Contractor. (Catalog information is unacceptable, provide point to point drawings.)
2. The Mechanical Contractor shall furnish and install all control equipment requiring connections to air, water, steam, etc., such as pneumatic electric relays, remote bulb temperature controls, solenoid valves, aquastats and pressure controls.
3. The Mechanical Contractor shall reimburse the Electrical Contractor for any changes in system design i.e.; control or equipment which affects the Electrical Contractor. Also refer to equipment connections, controls and instrumentation in 260500.

I. Workmanship and Coordination:

1. Make installation substantially as shown on the plans.
2. Make alterations in location of apparatus or conduit as may be required to conform to building construction without extra charge.
3. Mechanical equipment service clearances and electrical apparatus service clearances as specified in their respective manufacturer's product data shall be maintained free from conduit.
4. Cooperate with other trades in their installation of work.
5. Complete the installation in a workmanlike manner, completely connected and ready to give proper and continuous service.
6. Use only experienced licensed electricians.

J. Cutting and Patching:

1. Notify the General Contractor in ample time, of the location of all chases, sleeves, and other openings required in connection with the work of this contract.
2. Cutting and patching made necessary because of failure to comply with the above shall be done by the General Contractor at the expense of the Electrical Contractor.
3. When it is necessary for the Electrical Contractor to cut building materials, it shall be done in a neat and workmanlike manner meeting with the approval of the Architect.
4. Holes through concrete shall be carefully drilled with a "Concrete Termite" drill. A Star Drill or Air Hammer will not be permitted. Structural members shall not be cut without approval from the Architect.
5. Any penetrations thru the roof shall be made with "Stoneman" 900 Series flashing connections as manufactured by Elmdor/Stoneman, City of Industry, California, or as approved by the Architect.
6. Any penetrations made in exterior or basement foundation walls shall be sealed with Thunderline "Link-Seal" connections, as manufactured by Thunderline Corporation, Wayne, Michigan.

K. Manufacturer's Instructions:

1. Apply, install, connect, erect, use, clean, and condition articles, materials and equipment as directed by the manufacturer.

L. Provide separate support for all devices mounted in or to lay-in ceiling tile. Ceiling tile shall not be used to support any device.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS:

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the National Electrical Code for all voltages specified.
- C. Inaccessible Equipment:
 1. Where the Engineer determines that the Contractor has installed equipment without proper clearances or not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed at no additional cost to the Owner.

- a. Install access panels as approved by the Architect to provide access to all equipment, J-boxes and outlets located in non-accessible spaces. Panels shall be flush locking type with a fire rating equal to the ceiling system.
 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and ductwork. Outlet and box covers shall be removable by using regular length (8") screw drivers.
- D. Distribution Equipment:
1. All items of Electrical Distribution Equipment (switchboards - panelboards - disconnects) shall be of one manufacturer, unless specifically noted on the drawings, in the specifications, or approved by the Engineer. Intermixing of distribution equipment by different manufacturers will not be permitted.
 2. Provide a Type 1 surge protective device for lightning protection on each service entrance for each building. The surge protective device shall meet the requirements of UL 1449. Refer to drawings for voltage and phasing of service. Arrester shall be located within the main switch, panel or switchboard enclosure and connected with 12" maximum leads. Surge protective devices shall have an enclosure suitable for indoor or outdoor mounting and shall utilize metal oxide varistors that are individually fused.
 - a. 120/208V and 120/240V Single Phase: Maximum Voltage Protection Ratings shall be 700V L-N and 1200V L-L. Minimum MCOV rating shall be 150V L-N and 300V L-L, minimum nominal discharge current shall be 10,000A, minimum short circuit current rating shall be 25,000A, and minimum surge current rating shall be 36,000A. Square 'D' #SDSA1175 or approved equal.
 3. Equipment layouts on the drawings are based on one manufacturer. Verify all actual equipment sizes with equipment manufacturer prior to bidding.
 4. If layout changes are required due to differing electrical manufacturer's equipment size, they must be submitted to and approved by the Engineer. National Electric Code working clearances must be maintained at all times. Extra remuneration will not be allowed for layout changes that differ from those shown.
 5. Provide and install all steel supports as required for mounting of electrical equipment.
 6. Anchor all free standing electrical equipment including switchboards, switchgear, substations, motor control centers, paralleling gear, transfer switches, transformers, etc. to the floor with plated, 1/2" diameter minimum, anchor bolts or as recommended by the manufacturer.

1.10 EQUIPMENT CONNECTIONS, CONTROLS AND INSTRUMENTATION:

- A. General: The following applies to all electrical power and control connections for all equipment requiring electrical installation work provided by others.
- B. Electrical Contractor shall install and connect the following items for equipment requiring electrical power that is either furnished or specified by other Contractors and/or the Owner.

Where these required items are not furnished with the equipment being connected, it shall be the Electrical Contractors responsibility to provide the necessary items including conduit, boxes and wiring.

1. Disconnecting Devices
 2. Thermal Overload Devices
 3. Overcurrent Devices
 4. Short Circuit Protective Devices
 5. Power Factor Correction Devices
 6. Voltage Transformation Equipment
 7. Control Devices (Local and Remote)
 8. Audible and Visual Control Status Annunciation Devices
 9. Equipment Mounting Structures
 10. Additional Miscellaneous Devices
- C. In general, all major equipment will be specified to be factory prewired with only service and interconnecting wiring required at the site by the electrical contractor; however, the Electrical Contractor shall check all divisions of the specification to verify if the equipment is specified factory prewired and if not, then it shall be the responsibility of the Electrical Contractor to provide the complete wiring of the equipment in accordance with wiring diagrams provided by other contractors and/or Owner to the Electrical Contractor. All interconnecting of equipment shall be by the Electrical Contractor.
- D. All line and low voltage wiring and connections required to control the equipment are a part of this section. All wiring shall be in conduit. All conduit, wiring, and terminations shall be provided by the Electrical Contractor.
- E. The Electrical Contractor shall provide 120 volt control power supply; #12 Ga. CU. THHN/THWN in 1/2"C. minimum at all points required by controls, instrumentation and sprinkler risers. Circuit as shown on the plans or to the nearest 120 volt panel if no circuiting is indicated. Use spare 20 Amp. breakers. Each control panel shall be on a separate circuit unless otherwise indicated. If the controlled equipment is fed from the emergency system, then the control power supply must feed from the emergency system.
- F. The Contractor shall become familiar with the equipment to be furnished by the other Contractors and/or the Owner in connection with this work and include provisions for such connections and work in the Contractor's price. Extra remuneration will not be allowed for such work.
- G. Connections to all equipment have been designed from units as specified on the drawings or in the specifications. In the event equipment or control differs on approved shop drawings it shall be the responsibility of the Supplying Contractor to coordinate electrical connections to the units and reimburse Electrical Contractor for any changes in system design. These changes shall not involve additional cost to the Owner.
- H. Review all plans and specifications to verify all equipment connections that are required by mechanical and/or other contractors. Although the electrical drawings will show equipment connection requirements, it is the Electrical Contractor's responsibility to connect all equipment furnished by other Contractor's at no extra cost to the Owner, even if this equipment connection is not shown on the electrical drawings. Coordinate all required connections not shown on the electrical drawings with the Engineer.

1.11 NAMEPLATES:

- A. General: The following items shall be equipped with nameplates:
1. Disconnect switches (fused or nonfused), transformers, switchgear and switchboards (including branch circuit breakers/switches), panelboards, separately mounted circuit breakers, starters, contactors, relays, junction boxes and pull boxes.
- B. Inscription: Nameplates shall adequately describe the function or use of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage, and phase, A.I.C. rating of the supply (see schedules, one-line diagram, and color coding). For example, "Panel A" 120/208 V, 3-Phase, 4-Wire, 10,000 A.I.C. or "50,000 AIC with 22 KA Breakers, Series with class 'J' Fuses":
1. Phase A - Black
 2. Phase B - Red
 3. Phase C - Blue
 4. Neutral - White
 5. Ground - Green
- C. The name used for a machine nameplate shall be the same as the one used on the machine's motor starter, disconnect and P.B. station nameplates. Nameplates for fused switches and panels shall also indicate fuse type and size.
1. In addition to the instructions listed above:
 - a. All panelboards and transfer switches fed from the emergency system shall be labeled "Emergency System".
 - b. All panelboards and transfer switches fed from the standby system shall be labeled "Standby System".
- D. Construction:
1. Nameplates shall be as follows:
 - a. Normal power - laminated phenolic plastic white front and back with black core.
 - b. Emergency System - laminated phenolic plastic red front and back with white core.
 - c. Standby System - laminated phenolic plastic blue front and back with white core.
 2. Lettering shall be engraved through front layer to form 1/4" characters. Nameplates shall be securely fastened to the equipment to be identified, with No. 4 Phillips, round head, cadmium plated, steel self tapping screws or nickel plated brass bolts. Motor nameplate may be nonferrous metal not less than 0.03 inches thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Letters engraved thus, shall be filled with contrasting enamel. All nameplates and their installation are part of this work. Free hand lettering or dymo label marker will not be acceptable.

1.12 MATERIALS OF APPROVED EQUAL:

- A. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model or catalog number, and only such specific items may be used in the base bid, except as hereinafter provided.
- B. Unless requests for changes in base bid specifications are received, approved and noted by written addendum prior to the opening of bids, the successful contractor will be held to furnish specified items.
- C. After contract is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment".

1.13 SUBSTITUTION OF EQUIPMENT:

- A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents, may be approved by the Engineer, only if the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence and due to conditions beyond control of the Contractor. Provide documentary proof in writing from the manufacturer that the specified equipment will not be available in time. If the Contractor is responsible for the delay, the substitution will not be approved.
- B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.

1.14 SUBMITTALS: IN ACCORDANCE WITH SECTION SAMPLES AND SHOP DRAWINGS, FURNISH THE FOLLOWING:

- A. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- C. Submittals shall be complete and submitted together for each section. Individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assemble as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_____". Mark out all statements on sheets that do not apply otherwise. The Engineer may select options and equipment not originally specified. All options that are not marked out will be assumed that the Contractor will furnish the same.
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.

4. Mark catalog cuts to indicate equipment, capacities, finishes, sizes, etc. Each individual item shall have its own sheet provided for approval. (Example: Separate sheets for each panelboard.)
- D. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 4. Quantities of materials will not be verified by the Architect or Engineer. Approval stamp on shop drawings does not constitute approval of quantities listed on shop drawings.
 5. Shop drawings:
 - a. All shop drawings shall be checked and signed by this contractor and general contractor prior to submittal to the Architect/Engineer.
 - b. Shop drawings submitted without Contractor's signatures or approval and verification will not be approved.
 - c. Shop drawings shall be submitted on wire, cables, devices, lighting fixtures (including distribution curves), panelboards, disconnects, switchboards, motor, conduit, raceway systems, low-voltage systems, etc.
 6. Each sheet shall be either 8 1/2" x 11"; 8 1/2" x 13"; or 11" x 17" bond with a 5" x 3" clear area for engineer's stamp. (This area shall not be used by this contractor or the general contractor's stamp.) Larger drawings shall be able to be blue printed.
 7. Submittals for low-voltage systems (fire alarm, security, PA, controls, sound, clock, nurses' call, intercom, etc.) shall include complete riser diagrams showing all conductors and conduit sizes.
- E. Engineer's acceptance of Compliance Submittals will not relieve the Contractor from his responsibility for any deviations from the requirements of the contract documents, unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and the Engineer has given written approval to the specific deviation; nor shall any acceptance by Engineer relieve Contractor from responsibility for errors or omissions in Compliance Submittals.
- F. Quantity of Submittals: See the general specification sections.
- 1.15 ELECTRICAL WORK COMPLETION:
- A. Before requesting final inspection the following work must be completed.
 - B. Operating Instructions:

1. The Contractor shall submit along with the shop drawings of the equipment, three (3) copies of operating instructions for all items. Instructions shall be prepared by the manufacturer of the equipment.
2. After the operating instructions have been approved by the Engineer, the Contractor shall include the three (3) copies in maintenance instructions brochures.
3. The Contractor shall also obtain all manufacturers' instructions, manuals, and one complete set of drawings and turn these over to the Architect at the completion of the project.
4. The Contractor shall keep in a safe place; all keys and special wrenches furnished with equipment under this contract and shall give same to the Architect at the completion of the project.
5. The Contractor shall prepare a complete brochure, in triplicate, covering all systems and equipment furnished and installed under his contract. Brochures shall be submitted to the Architect-Engineer for approval and delivery to the Owner. The cost of this brochure shall be included in the contract cost. Brochures shall contain the following:
 - a. Certified equipment drawings and/or catalog data clearly marked for equipment furnished as required for approval submission under detailed section of the specifications.
 - b. Complete operating and maintenance instructions for each item of equipment.
 - c. Complete part list for each equipment item.
 - d. Any special emergency operating instructions or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
6. Brochures shall be bound in hard backed three ring binders with an index, sub dividers and reinforced sheets.
 - a. Project name and address.
 - b. Section of work covered by brochure, i.e., "Electrical Work".
 - c. Name and address of Architect.
 - d. Name and address of Engineer.
 - e. Name and address of Contractor.
 - f. Telephone number of Contractor, including night or emergency number.
7. In addition to these written instructions, each respective Contractor shall fully and carefully instruct the Owner, or Owner's selected representatives, as to the proper operation, care and maintenance of each system and its equipment.

1.16 TESTING AND ADJUSTMENT:

- A. Record loads on each phase of all panelboards, distribution panels, switchboards, transformers and submit final readings to the Architect for records. This Contractor shall adjust equipment, instruments, gages, meters etc., as required to test and adjust these systems.
- B. Check, test, and adjust the mechanisms of all electrical equipment and adjustable parts of lighting fixtures as required for optimum performance.

- C. Perform tests for insulation resistance in accordance with the requirements of the National Electrical Code and insure that all circuits are free from short circuits.
- D. Keep a calibrated voltmeter and ammeter available at all times and provides service for test readings when and as required, up until the project is accepted by the Owner.
- E. Electrical Testing and Verification: Refer to the following specification sections (as applicable) for required tests and verifications:
 - 1. 260519 – Low Voltage Electrical Power Conductors and Cables
 - 2. 260526 – Grounding and Bonding for Electrical Systems
 - 3. 262413 – Switchboards
 - 4. 262416 – Panelboards
 - 5. 262726 – Wiring Devices
 - 6. 263213 – Gensets and Accessory Equipment
 - 7. 263600 – Automatic Transfer Switches

1.17 AS-BUILT DRAWINGS:

- A. Show on black or blue line prints in red ink all changes from original plans made during the installation. Return two (2) sets of red marked drawings, specifications and addenda, as set forth in the General Conditions, to the Architect upon completion of the project.

1.18 FINAL INSPECTION:

- A. Final inspection will be made upon written request from the General contractor after the project is completed; in accordance with the Supplementary General Conditions.
- B. Furnish a workman familiar with this project to accompany the Engineer on final inspection and have available ladders, drop cords, and other equipment as required to gain access to any portion of this system.
- C. This Contractor and his principal subcontractors shall be represented at the inspection by a person of authority responsible to demonstrate to the engineer that his work conforms to the intent of the plans and specifications.
- D. Extra inspections made necessary by the Electrical Contractor's failure to comply with the conditions as set forth above shall be charged to the Contractor for the Inspector's time both on the job and spent in travel between the office and the project site.

1.19 GUARANTEE:

- A. Guarantee all work, material and equipment for a period of one year after date of substantial completion.
- B. During the one year guarantee period the Electrical Contractor shall be responsible for any defects which develop in the electrical systems. Upon notification of a defect by the General Contractor the Electrical Contractor shall make immediate effort to correct it and shall notify the Architect when this work is completed. This guarantee does not include ordinary lamp failure.

- C. Repairs and/or replacements shall be made with no cost to Owner.
- D. Provide as part of the work of this contract, in addition to the first year's guarantee on equipment and materials, the following routine maintenance and inspection. (The one year time period will not start until each item is completed in accordance with plans and specifications and accepted by the Owner). Correct and adjust all emergency systems, controls, fire alarm, transformer, etc. This service to be provided throughout the guarantee period.

1.20 SINGULAR NUMBER:

- A. Where any device or part of equipment is referred to in these specifications in the singular number (such as "the switch"), such reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

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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 other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. Section includes:
 - 1. Building wires and cables rated 600 VAC and less.
 - 2. Connectors, splices, and terminations rated 600 VAC and less.
 - 3. Wire lubricating compound.
 - 4. Control wiring.
 - 5. Communication and signal wiring.
 - 6. Fireproofing tape.

1.3 SUBMITTALS

- A. Product Data (Where indicated in Section "Common Work Results for Electrical", provide the following information): For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended use.
- B. Comply with NFPA 70.
- C. Comply with NEMA WC 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES (POWER AND LIGHTING):

- A. Conductors and Cables: NEMA WC 70, except as hereinafter specified.
 - 1. All conductors shown on plans are sized for copper.
 - 2. UL label required.
- B. Single Conductor:
 - 1. Soft annealed copper.
 - 2. Stranded for sizes No. 8 and larger. Solid or stranded for sizes No. 10 and smaller, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise.
 - 3. Minimum size No. 12, except where larger sizes are shown. (Size No. 14 minimum for controls).

C. Stranding:

1. Conductors between stationary and moving devices, such as hinged doors or panels, shall have Class H or Class K stranding. All other conductors shall have Class B or Class C stranding.

D. Insulation:

1. THHN-THWN, XHHW - Sizes No. 12 and larger.

2.2 SPLICES AND JOINTS:

A. In accordance with UL 486 A, B, D and NEC.

B. Split-bolt type connectors are not allowed.

C. Branch circuits (No. 10 and smaller):

1. Connectors: Solderless, screw-on, reusable pressure cable type, 600 volt, 105 degree C. with integral insulation, approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped wires.
3. The number, size, and combination of conductors, as listed on the manufacturer's packaging shall be strictly complied with.

D. Branch Circuits (No. 8 and No. 6):

1. Connectors: Pre-insulated, mechanical, reusable cable type, 600 volt, 90 degree C. with integral insulation, approved for copper and aluminum conductors, cold temperature rated to -45 degree C. Connectors shall be equal to those manufactured by Polaris Connectors.
2. Provide connectors rated for the location where installed.
3. The number, size, and combination of conductors, as listed on the manufacturer's packaging shall be strictly complied with.

E. Feeder Circuits:

1. All feeder conductors shall be the same size and type and be continuous from the overcurrent device to the panel or equipment the feeder terminates at.
2. Connectors shall be indent type, UL listed for use with the size and type of wire installed of high conductivity and corrosion-resistant material. Do not install more than one conductor per connector unless the connector is UL listed for use with the number of conductors installed.
3. Power distribution blocks shall be provided for splices or where quantity or size of conductors exceeds the terminal rating of the device to be connected. Power distribution blocks shall be equal to Square D by Schneider Electric Class 9080 Type LB or Mersen Electrical Power MPDB series. Provide with covers. Power distribution blocks shall be securely mounted in a code sized enclosure.
4. Field installed compression connectors for cable sizes 250 kcmil and larger shall have not less than two clamping elements or compression indents per wire.

5. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Insulation rating shall be not less than that of the conductor that is being joined.
6. Plastic electrical insulating tape: Flame retardant, cold and weather resistant.

2.3 CONTROL WIRING:

- A. Unless otherwise specified in other sections of these specifications, size control wiring as specified for power and lighting wiring, except the minimum size shall be not less than No. 14, 90 degrees C. insulation. Where stranded conductors are used, provide with spade type insulated copper terminals.
- B. Size wire large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

2.4 COMMUNICATION AND SIGNAL WIRING:

- A. Shall conform to the recommendations of the manufacturers of the communication and signal systems; however, not less than what is shown.
- B. Wiring shown is for typical systems. Provide wiring as recommended by the manufacturer for the systems being furnished.
- C. Multi-conductor cables shall have the conductors color coded.

2.5 WIRE LUBRICATING COMPOUND:

- A. The cable pulling lubricant shall be compatible with all cable jackets. The lubricant shall be UL (or CSA) listed. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes.
- B. A 200-gram sample of the lubricant, when placed in an one-foot, split metal conduit and fully dried for 24 hours at 105 degrees C, shall not spread a flame more than three-inches beyond a point of ignition at a continued heat flux of 40 kW/m². Total time of test shall be one-half hour.
- C. Approved Lubricant is:
 1. Polywater J from American Polywater Corporation

PART 3 - EXECUTION

3.1 INSTALLATION, GENERALLY:

- A. Install in accordance with the NEC, and as specified.
- B. Install all wiring in raceway systems.
- C. Where No. 10 or No. 12 stranded conductors terminate at receptacles, toggle switches, or other devices with a screw-type connection, provide a solid conductor pigtail or spade-type connector listed for use with the appropriate class of stranded wire.

- D. Install a ground wire sized per NEC 250.122 in each conduit containing phase conductors.
- E. Color Code:
1. All conductors shall be identified by circuit number and color coding at all termination points and splices. All conductors shall be identified in all pull and junction boxes by the following method of color coding. Means of identification shall be permanently posted at each branch circuit panel with a nameplate identifying color coding system used in that panelboard.

Phase	240/120V
A	Black
B	Orange
C	Blue
Neutral	White
Ground	Green
Iso. Grd	Green w/Yellow

2. Use solid color compound or solid color coating for No. 6 and smaller branch circuit conductors and neutral sizes.
 3. Phase conductors No. 4 and larger color code using one of the following:
 - a. Solid color compound or solid color coating.
 - b. Colored as specified using 3/4-inch wide tape. Apply tape in half overlapping turns for a minimum of three-inches for terminal points, and in junction boxes, pull boxes, troughs, manholes, and handholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.
 - c. Yellow stripe on isolated ground may be 1/4-inch wide yellow tape on top of green.
 4. Where neutrals are located in the same raceway, junction box or enclosure, neutrals shall be marked or labeled to indicate which circuit conductor (phase conductor) they are associated with. Neutrals (with stripes matching the associated phase conductor color) meeting the requirements of NEC Section 200.6 are acceptable for this purpose.
 5. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
 6. Provide plastic engraved color code legend on each panelboard and switchboard per NEC Section 210.5 (C).
 7. All improperly color coded conductors will be completely replaced at no additional cost to Owner.
- F. All cable and wiring shall be continuous between electrical equipment. Splices shall not be added except as required for taps in branch circuits or as approved by the engineer.
- G. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes, or handholes. Do not splice cables in panelboards, switchboards, disconnects, etc.

- H. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- I. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, and tie all cables.
- J. Seal cable and wire entering a building from underground between the wire and conduit, where the cable exits the conduit, with a non-hardening approved compound.
- K. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 - 2. Use ropes made of nonmetallic material for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Engineer.
 - 4. Pull multiple cables into a single conduit with a single continuous pull.
 - 5. Use wire lubricant per this specification when recommended by the cable manufacturer or as required to prevent damage to cables during installation.
- L. Individual neutrals shall be provided for each circuit. Multi-wire branch circuits (i.e. Two or more phase sharing a neutral conductor) shall not be allowed, unless specifically noted or shown on the plans. Where multi-wire branch circuits are shown or noted on the plans, provide a disconnecting means that will simultaneously disconnect all phase conductors at the panel where the branch circuit originates.

3.2 INSTALLATION IN MANHOLES:

- A. Install and support cables in manholes on the steel racks with porcelain or equal insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.

3.3 SPLICE INSTALLATION:

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Where the Engineer determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the Owner.

3.4 CONTROL, COMMUNICATION, AND SIGNAL WIRING INSTALLATION:

- A. Unless otherwise specified in other sections of these specifications, install wiring as described below. Wiring shall be connected to perform the functions shown and specified in other sections of this specification.
- B. Except where otherwise required, install a separate power supply circuit for each system, or control equipment, or control power. Circuit to nearest 120 volt panel or nearest emergency panel if equipment controlled is connected to emergency system. Use spare 20 Amp breakers in panels where none are designated. Verify all requirements with actual equipment supplied in field.

- C. Install a breaker lock-on clip on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems. Lock-on clips for circuit breakers serving fire alarm systems shall be painted red.
- D. System voltages shall not exceed 120 volts and shall be lower voltages where shown on the drawings or required by the NEC.
- E. Wire and cable identification:
 - 1. Install a permanent wire marker on each wire at each termination, outlet box, junction box, panel, and device. Markers shall be typed or handwritten and shall be clearly legible.
 - 2. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
 - 3. Wire markers shall retain their markings after cleaning.
 - 4. In each manhole and handhole, install permanent, waterproof tags to identify the cable type/system and the building or area served.

3.5 FEEDER IDENTIFICATION:

- A. In each, interior pullbox and junction box, identify each phase, neutral and/or ground conductor by conductor color coding or tape based on system voltage.
- B. In manholes and handholes, install permanent, waterproof tags to identify the cable type. Identify each phase, neutral, and/or ground conductor by conductor color coding or tape based on system voltage.

3.6 FIELD TESTING:

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices such as fixtures, motors, or appliances.
- B. Test shall be performed by megger and conductors shall test free from short-circuits and grounds.
- C. Test conductors' phase-to-phase and phase-to-ground.
- D. Megger motors after installation but before start-up and test free from grounds.
- E. The Contractor shall furnish the instruments, materials, and labor for these tests.

END OF SECTION

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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 other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY:

- A. This section includes grounding and bonding systems and equipment.

1.3 SUBMITTALS:

- A. Product Data (Where indicated in Section "Common Work Results for Electrical", provide the following information): For each type of product indicated.
- B. As-Built Data: Plans showing dimensioned as-built locations of grounding features, including the following:
 - 1. Ground rods.
 - 2. Grounding arrangements and connections for separately derived systems.
- C. Test Records: Submit the following test records to the Engineer for review and approval, and include in the operational and maintenance manuals:
 - 1. Grounding system tests per paragraph FIELD QUALITY CONTROL in Part 3 of this Section.

1.4 QUALITY ASSURANCE:

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

PART 2 - PRODUCTS

2.1 CONDUCTORS:

- A. Insulated General Purpose: UL and NFPA 70 approved types, copper, with THW, XHHW or dual rated THHN-THWN insulation color identified green.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B3.
 - 2. Stranded Conductors: ASTM B8.
- C. Size conductors not less than what is shown on the drawings and not less than required by the NFPA 70.

2.2 GROUND BUS:

- A. Pre-drilled rectangular bars of annealed copper, 1/4 by 4 inches in cross-section with 9/32 inch holes spaced 1-1/8 inches apart. Stand-off insulators shall comply with UL 891 for use in switchboards, 600V and shall be Lexan or PVC, impulse tested at 5000V.

2.3 GROUND RODS:

- A. Copper-clad steel, sectional type, 3/4-inch diameter by 20 feet long.

2.4 CONNECTORS:

- A. Listed and labeled by a NRTL acceptable to the 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.
- C. Welded Connections:
 - 1. Exothermic welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
 - 2. For structural steel, steel grounding stud for compression connector.
- D. Compression Connectors: Hydraulic crimped, irreversible compression type kits. Connectors shall be factory filled with oxide inhibitor. All crimps shall be made with a hydraulic tool that embosses the index number on the outside of the connector.
- E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long barrel, two-bolt connection to ground bus bar.
- F. All splices and grounding electrode connections shall be made with exothermic welds or with hydraulic compression fittings.

2.5 INTERSYSTEM GROUND BAR:

- A. Complies with UL 467.
- B. Base and cover shall be impact resistant and UV rated.
- C. Shall be rated for copper and aluminum conductors.
- D. Shall have provisions for one main grounding electrode conductor and a minimum of four bonding conductors.

PART 3 - EXECUTION**3.1 APPLICATIONS:**

- A. Conductors: Install solid or stranded conductors for #10 AWG and smaller and stranded conductors for #8 AWG and larger unless otherwise indicated.

- B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
- C. Isolated Ground Conductors: Green colored insulation with continuous yellow stripe. On feeders with isolated ground, identify isolated grounding conductor with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors or hydraulic compression connectors except as otherwise indicated.
 - 3. Connections to Structural Steel: Welded connectors.
 - 4. Aboveground Connections to Ground Rods: Bolted connectors.

3.2 INSTALLATION, GENERALLY:

- A. Ground in accordance with the NFPA 70 as shown, and as hereinafter specified. All equipment ground conductors shall be terminated on a ground bus or ground lug attached to equipment can.
- B. Service Grounding:
 - 1. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus.
 - 2. Install a main bonding jumper between the neutral and ground buses.
- C. System Grounding:
 - 1. Secondary service neutrals shall be grounded at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance) ground the secondary neutral.
 - 3. Individual Buildings: Bond Main Disconnect ground bus to building steel, 20 foot re-bar in foundation, water pipe, driven ground, and ground ring.
- D. Equipment Grounding:
 - 1. Metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents.

E. Generator Grounding:

1. Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.3 PRIMARY EQUIPMENT AND CIRCUITS:

A. Comply with IEEE C2 (National Electrical Safety Code) grounding requirements.

B. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.

C. Duct Banks and Manholes:

1. Provide a bare equipment grounding conductor in each duct bank containing medium or high voltage cables. Connect the grounding conductors to the switchgear ground bus, to all manhole hardware, to the cable shielding of medium or high voltage cable splices and terminations, and equipment enclosures.
2. Provide a grounding conductor having at least 50 percent ampacity of the largest phase conductor in the duct bank.
3. Provide a ground rod at each manhole. Seal floor opening with waterproof, nonshrink grout
4. Connect the equipment grounding conductor to the ground rod.

D. Pad Mounted Transformers:

1. Provide a driven ground rod and connect with a grounding electrode conductor to the grounding terminals at the transformer.
2. Ground the secondary neutral.
3. Connect lightning arrester grounds to the pad ground per NFPA 70.

E. Lightning Arresters: Connect lightning arrester grounds to the equipment ground bus, or ground rods as applicable.

F. Metallic Conduit: Metallic conduits which terminate without mechanical connection to housing of electrical equipment by means of locknut and bushings or adapters, provided with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground box.

3.4 SECONDARY EQUIPMENT AND CIRCUITS:

A. Main Bonding Jumper: Connect the secondary service neutral to the ground bus in the service equipment.

B. Water Pipe and Supplemental Electrode:

1. Provide a ground conductor connection between the service equipment ground bus and the metallic water pipe system. Jumper insulating joints in the water pipe.

2. Provide a supplemental grounding electrode and bond to the water pipe ground, or connect to the service equipment ground bar.
- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors. Connect the neutral to the ground bus (main bonding jumper).
- D. Switchgear, Switchboards, and Unit Substations:
 1. Connect the various feeder green grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 2. Connect the grounding electrode conductor to the ground bus.
 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and ground wire to the ground bus.
- E. Transformers:
 1. Exterior: Exterior transformers supplying interior service equipment shall also have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest cold water pipe and the nearest structural steel that are effectively grounded. If neither of these are available, provide a driven ground rod or other code approved grounding electrode.
- F. Conduit Systems:
 1. Ground all metallic conduit systems.
 2. Non-metallic conduit systems shall contain a grounding conductor.
 3. Conduit provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the conduit via grounding bushings.
- G. Feeders and Branch Circuits: Install green grounding conductors with feeders and branch circuits in all feeders and branch circuits and in any raceway containing a phase conductor.
- H. Isolated Grounds: All isolated grounds must be insulated and must terminate on isolated ground buses in the equipment. No other equipment grounds shall be connected to isolated ground bus. Where isolated grounds are shown and PVC conduit is used, an equipment ground must be installed to ground metallic boxes and mounting straps.
- I. Boxes, Cabinets, Enclosures, and Panelboards:
 1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass (except for special grounding systems for intensive care units and other critical units shown.).
 2. Make ground wire connections to ground bus in motor control centers, panelboards, etc.

- J. Receptacles and toggle switches are not approved for grounding through their mounting screws. Ground with a ground wire from green ground terminal on the device to the outlet box ground screw.
- K. Ground lighting fixtures to the green grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixture connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- L. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green ground conductor.
- M. Telephone Terminal Boards: Provide a #3/0 AWG CU ground in 1" C. from each board to the main service disconnect ground bus.

3.5 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 top of rod 4 inches above finished floor. Seal floor opening with waterproof, non-shrink 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 to ground rod or grounding conductor. Make connections with #4 AWG minimum, stranded, hard drawn copper bonding conductor. Run 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 two ground rods and ground ring around the pad. Ground pad-mounted equipment and non-current carrying metal items to underground cable and grounding electrodes.

3.6 CONDUCTIVE PIPING:

- A. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.

3.7 SPLICES:

- A. All splices and grounding electrode connections shall be made with exothermic welds or with hydraulic compression fittings.

3.8 GROUNDING RESISTANCE:

- A. Grounding system ground resistance must not exceed 5 ohms. Final tests shall assure that this requirement is met.

- B. Where permanent ground connections are required, make the connections by the exothermic process or hydraulic compression method to form solid metal joints.
- C. Where rock prevents the driving of vertical ground rods, install grounding electrodes in horizontal trenches to achieve the specified resistance.
- D. Where more than one ground rod is required to meet the specified resistance, they shall be located at least 10 feet apart. Interconnect with grounding electrode conductor below grade and as otherwise indicated.

3.9 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 subject to strain, impact, or damage.
- B. Grounding electrode conductors shall be continuous.

3.10 FIELD QUALITY CONTROL:

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation. Inspect compression type connections for proper die index number embossment.
- B. Perform the following testing:
 - 1. After installing grounding system, but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. 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 ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after the 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. Submit test results to the Engineer.
 - c. Excessive Ground Resistance: If resistance to ground exceeds specified values, promptly notify Engineer, and include recommendations for reducing ground resistance.

END OF SECTION

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SECTION 26 05 33
RACEWAYS 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. Description:

1. This section includes the furnishing, installation, and connection of raceways, fittings, and boxes to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
2. The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

B. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Non-metallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Non-metallic wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes and enclosures.
7. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS:

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.
- D. RGS: Rigid galvanized steel.

1.4 ACTION SUBMITTALS:

- A. Product Data (Where indicated in Section "Common Work Results for Electrical", provide the following information): For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings (Where indicated in Section "Common Work Results for Electrical", provide the following information): For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 CONDUIT:

- A. Raceway Size: In accordance with the NFPA 70 but not less than 1/2-inch unless otherwise shown. Where permitted by the NFPA 70, 1/2-inch flexible conduit may be used for connections to recessed lighting fixtures.
- B. Raceway Supports:
 - 1. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
 - 2. Pipe Straps: Fed. Spec. FF-S-760, Type I, Style A or B.
 - 3. Individual Raceway Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 - 4. Multiple Raceway (trapeze) hangers: Not less than 1-1/2 by 1-1/2 inch, 12 gauge steel, cold formed, lipped channels or not less than 2-1/8 by 2-1/8 inch, 18 gauge B-Line "4Dimension Channel"; with not less than 3/8-inch diameter steel hanger rods.
 - 5. Solid Masonry and Concrete Anchors: Fed. Spec. FF-S-325; Group III self-drilling expansion shields, or machine bolt expansion anchors Group II, Type 2 or 4, or Group VIII.
- C. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.

2.2 RACEWAYS:

- A. Install raceway types as shown on drawings and as listed below.
- B. Metal Conduit:
 - 1. Rigid steel: UL 6 and ANSI C80.1.
 - 2. Rigid aluminum: UL 6A and ANSI C80.5.
 - 3. Rigid intermediate steel conduit (IMC): UL 1242 and ANSI C80.6.
 - 4. Electrical metallic tubing (EMT): U.L. 797 and ANSI C80.3. Maximum size 5-inch. Permitted only with cable rated 600 volts or less.
 - 5. Flexible steel conduit (commercial Greenfield): UL 1, zinc-coated steel.
 - 6. Liquid-tight flexible metal conduit: UL 360 flexible galvanized steel tubing covered with extruded liquid-tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper bonding conductor spiral between the convolutions.
 - 7. PVC Coated Rigid Steel: NEMA RN 1. Conduit and fittings shall be as manufactured by Robroy Industries; Plasti-Bond, Perma-Cote, and KorKap or Thomas & Betts; Ocal. Any deviation will require approval of the specifying Engineer or Owner.
 - a. Shall be UL listed.
 - b. All male threads on conduit, elbows and nipples shall be protected by application of a urethane coating.
 - c. All female threads on fittings or conduit couplings shall be protected by application of a urethane coating.

C. Conduit Fittings for Metal Conduit:

1. Comply with NEMA FB 1 and UL 514B.
2. Rigid steel and IMC conduit fittings:
 - a. Standard threaded couplings, locknuts, bushings, and elbows: Fed. Spec. W-F-408, except only material of steel or malleable iron is acceptable. Integral retractable type IMC couplings are acceptable also.
 - b. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure
 - c. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted. Bushings for conduit smaller than 1-1/4-inch shall have flared bottom with ribbed sides.
 - d. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - e. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank coverplates having the same finishes as that of other electrical plates in the room.
 - f. In trade sizes 2-1/2 inches to 4-inches for rigid steel raceway or intermediate metal raceway, contractor may use Allied 'Kwik-Couple' fittings in lieu of individual steel couplings. 'Kwik-Couple' fittings shall not be used in hazardous locations. Where 'Kwik-Couple' fittings are used exterior for vertical risers, install fitting with taper end up.
3. Rigid aluminum conduit fittings:
 - a. Standard threaded couplings, locknuts, bushings, and elbows: Malleable iron, steel or aluminum alloy materials. Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4 percent copper are prohibited.
 - b. Locknuts and bushings: As specified for rigid steel and IMC raceways.
 - c. Set screw fittings: Not permitted for use with aluminum raceway.
4. Electrical metallic tubing fittings:
 - a. Fed. Spec. W-F-408, except only material of steel for compression type. Steel or die-cast is acceptable for set screw type. Die-cast compression is not acceptable.
 - b. Couplings and connectors: Concrete tight and rain tight, with connectors having flared throats. Use gland and ring compression type or set screw type couplings and connectors. Set screw type couplings for conduit 2 inches and larger shall be four set screws each. Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
 - c. Indenter type connectors or couplings are prohibited.

- d. In trade sizes 1-1/4 inches to 4 inches, contractor may use Allied “Kwik-Fit EMT” or “Kwik-Fit Compression EMT” fittings in lieu of individual steel couplings.
 - 5. Flexible steel conduit (greenfield) fittings:
 - a. Fed. Spec. W-F-406 and UL 5, except only steel or malleable iron material is acceptable.
 - b. Clamp type, with insulated throat.
 - 6. Liquid-tight flexible metal conduit fittings:
 - a. Fed. Spec. W-F-406, except only steel or malleable iron material is acceptable.
 - b. Type incorporating a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
 - 7. Expansion and deflection couplings:
 - a. UL 467 and UL 514.
 - b. Accommodate, 1.9 cm (0.75”) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, NFPA 70 Section 250.98, and the NFPA 70 code tables for ground conductors.
 - d. Shall be watertight, seismically qualified, corrosion-resistant, threaded for and compatible with rigid or intermediate metal conduit.
 - e. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.
 - f. Expansion fittings shall accommodate a minimum of 4-inches of movement.
 - D. Nonmetallic Conduit:
 - 1. PVC Conduit: NEMA TC 2 and UL 651 Schedule 40, conduit size is 3/4-inch minimum.
 - E. Conduit Fittings for Non-Metallic Conduits:
 - 1. PVC Conduit: Comply with NEMA TC 3; match to conduit type and material.
- 2.3 OUTLET BOXES:
- A. UL-50, UL514A and NEMA OS 1.
 - B. Cast metal where required by NFPA 70 or shown, and equipped with rustproof boxes; NEMA FB 1.
 - C. Sheet metal boxes: 4-inch square, galvanized steel, except where otherwise shown.

- D. Boxes installed in concrete or masonry and boxes larger than two gang shall be masonry type.
- E. Box extensions used to accommodate building finishes shall be of the same material as the recessed box.
- F. Boxes for use with IMC or RGS raceways shall be cast 'F' type or stainless steel unless noted otherwise on the drawings.
- G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

2.4 WIREWAYS AND AUXILIARY GUTTERS:

- A. Sized according to NFPA 70.
- B. Equip with hinged covers, except where removable covers are shown. Wireways shall only be permitted as indicated on the drawings or approved by the Engineer.
- C. Fittings and accessories: Include covers, couplings, offsets, elbows expansion joints, adapters, hold down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.
- D. Metal Wireways:
 - 1. Sheet metal complying with UL 870 and NEMA 250.
 - 2. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70 and shall be marked for intended location and application.

2.5 PULL AND JUNCTION BOXES:

- A. Small boxes shall comply with NEMA OS 1.
- B. Larger boxes shall comply with UL 50 and NEMA 250.
- C. Pull and junction boxes shall be code gauge steel boxes with hinged, bolted or screwed covers. Boxes shall be flush or surface mounted as shown or required.
- D. Junction and pull box shall be installed where shown on drawings and additional boxes shall be installed if required for pulling of wire provided location and installation is approved by the Architect. All boxes shall be code construction with screw type cover and shall be installed in accessible locations.
- E. Pull and junction boxes for use with IMC or RGS raceways shall be cast 'FS' type or stainless steel unless noted otherwise on the drawings. Comply with NEMA FB 1 and UL 1773 with gasketed cover.

2.6 CONCEALED SERVICE FLOOR BOX:

- A. Small capacity (2 gang) multi-service type: Provide with a 20A, 120 volt duplex receptacle and other devices as indicated. Verify color with the Architect. Steel City #664 Series or Hubbell #3SFB-SS Series.
- B. Large capacity (4 gang minimum) multi-service type: Provide with two or more duplex receptacles and other devices as indicated. Verify color with Architect. Steel City #665 Series or Hubbell # HBLCF8 Series.

2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
- B. Comply with SCTE 77.
- C. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
- D. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
- E. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- F. Cover Legend: Molded lettering shall be "ELECTRIC" for power handholes and "COMMUNICATIONS" or "CONTROLS" as applicable for low voltage handholes.
- G. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
- H. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
- I. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.

PART 3 - EXECUTION**3.1 RACEWAY:**

- A. Minimum 1/2-inch above grade, 3/4-inch below grade, and 1-inch on site, unless otherwise noted.
- B. A ground wire, sized per NFPA 70 Section 250.122 shall be installed in all conduits containing phase conductor(s).
- C. RGS or IMC must be used at all times when exposed to weather or physical abuse and in all NFPA 70 classified hazardous locations. EMT may not be used in direct contact with earth, or in concrete slabs on grade.

- D. U.L. approved Schedule 40 P.V.C. conduit may be used where feeders or branch circuits are to be run in earth or slabs (3/4" minimum).
 - 1. Use PVC coated RGS ells and risers approved for underground use. All conduit risers through concrete floors shall be RGS from below the top of the floor slab. Use conduit adapters when converting from PVC to steel conduit.
 - 2. Use plastic spacers when more than one conduit is installed together. See Drawings for areas requiring concrete encasement.
- E. All nonmetallic (PVC and fiberglass) conduits shall be provided with separate ground conductor sized per NFPA 70.

3.2 PENETRATIONS:

A. Cutting or Holes:

- 1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
- 2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space.

B. Fire Stop:

- 1. Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases, and maintains specified fire rating. Completely fill and seal clearances between raceways and openings with the fire stop material. See Section "Common Work Results for Low Voltage Systems Cabling" for firestopping requirements for low voltage cabling sleeves.

C. Fire Barrier Penetration Seals:

- 1. Manufacturer: Subject to compliance with requirements, provide fire barrier penetration seals of one of the following:
 - a. Electro Products Div./3M
 - b. Nelson; Unit of General Signal.
- 2. Provide seals for any opening through fire-rated walls, floors, ceilings, or assemblies used as passage for components such as conduits or cables.
- 3. Cracks, voids or holes up to 4-inch diameter: Use putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat and UL-listed.

4. Openings greater than 4-inch diameter and raceway sleeves thru floors at telephone terminal boards: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 degrees to 350 degrees F (121 to 177°C), that is UL-listed. KBS "Sealbags" manufactured by P-W Industries will be acceptable.
5. Execution: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions. All fire barrier seals shall meet the rating of the wall.

D. Waterproofing:

1. Install sleeves and sleeve seals at exterior floor, exterior wall, and roof conduit penetrations and completely seal clearances around the conduit and sleeve and make watertight as specified in Section, SEALING AND CAULKING.

3.3 CONDUIT SYSTEMS INSTALLATION, GENERAL:

A. Installation: In accordance with UL, NFPA 70, as shown, and as hereinafter specified.

1. Where non-metallic (PVC or fiberglass) conduits are used, a ground wire sized per NFPA 70 Section 250.122 shall be provided if not already specified.

B. All branches of the emergency system shall be installed entirely independent of other raceway systems. Common supports and hangers may be used.

C. Raceway Burial Depths: (Underground work)

1. 18" minimum, 30" maximum cover to grade or bottom of floor slab.
2. 24" minimum under streets, highways, roads, alleys, driveways and parking lots.
3. 2" minimum below concrete slab inside a building.
4. Prior to any underground work, contractor shall verify and locate all existing underground utilities. All existing utilities may not be shown on the drawings. Verify in field with owner and with utility locating services. The contractor shall exercise extreme caution when trenching or boring, hand digging at all crossings and where in close proximity of existing utilities. Repair existing parking lots, streets, roads, alleys, driveways, etc. to its original condition in a timely manner prior to substantial completion. Contractor shall be responsible for any damage to underground utilities.
5. Underground conduits shall be installed in a sand bed and in an organized manner.
6. Conduit ductbanks of more than 3 conduits (2" and larger) shall be installed with spacers and encased with flowable fill.

D. Install raceways as follows:

1. Comply with NECA 1, comply with NECA 101 for metal conduit and NECA 102 for aluminum conduit except where requirements on drawings or this article are stricter.
2. In complete runs before pulling in cables or wires.
3. Flattened, dented, or deformed raceways are not permitted. Remove and replace the damaged raceways with new undamaged material.

4. Assure raceway installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
6. Mechanically and electrically continuous.
7. Independently support raceway. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts.). Group raceways with common supports where possible. Conduit shall be supported within 12-inches of connectors.
8. Close ends of empty raceway with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
9. Raceway installations under fume and vent hoods are prohibited.
10. Secure raceways to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For RGS and IMC raceway installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make raceway connections to junction box covers.
11. Flashing of penetrations of the roof membrane is specified in Section, FLASHING AND SHEET METAL.
12. Raceways shall not be used as a support.
13. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the raceways.
14. Tightening set screws with pliers is prohibited.
15. Keep raceways a minimum of 6 inches away from parallel runs of flues and steam or hot-water pipes.

E. Raceway Bends:

1. Make bends with standard raceway bending machines.
2. Raceway hickey may be used for slight offsets, and for straightening stubbed out raceways.
3. Bending of raceways with a pipe tee or vise is prohibited.

F. Raceways Installed Under Metal - Corrugated Sheet Roof Decking

1. Where rigid metal conduit or intermediate metal conduit is not used, raceways shall be installed and supported so the nearest outside surface of the raceway is not less than 1.5 inches from the nearest surface of the roof decking.

G. PVC coated RGS:

1. Use only fittings listed for use with this type of conduit.
2. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduit and fittings. Use sealant recommended by conduit manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameter of the coated conduit.
4. All clamping, cutting, threading, bending, and assembly instructions listed in the manufacturer's installation guide should be vigorously followed. Installer certification, before installation, is required.

3.4 CONCEALED WORK INSTALLATION:

A. General:

1. Raceway and Outlet Boxes Installation: All raceway systems work and outlet boxes shall be installed concealed in walls, floor and roof construction or concealed within furred spaces or above ceilings. In equipment or mechanical rooms exposed work shall include feeders and connections to equipment unless noted otherwise.

B. In Concrete:

1. Raceway: RGS, IMC, PVC or EMT; except do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.
2. Align and run raceways in direct lines.
3. Install raceways through concrete beams only when the following occurs:
 - a. Where shown on the structural drawings.
 - b. As approved by the Structural Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of raceways in concrete that is less than three inches thick is prohibited. All raceways installed in concrete shall be approved by the Structural Engineer.
 - a. Raceway outside diameter larger than one-third of the slab thickness is prohibited.
 - b. Space between raceways in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
 - c. Install raceways approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the raceways.
5. Make couplings and connections watertight.

C. Above Furred or Suspended Ceilings and in Walls:

1. Raceways for conductors 600 volts and below:
 - a. RGS, IMC, rigid aluminum, or EMT. Types mixed indiscriminately in the same system are prohibited.
 - b. Do not use aluminum in wet locations or in contact with concrete.
2. Raceways for conductors above 600 volts:
 - a. RGS or rigid aluminum. Do not use aluminum in wet locations or in contact with concrete.
 - b. Aluminum conduit mixed indiscriminately with other types in the same system is prohibited.
3. Align and run raceways parallel or perpendicular to the building lines.

4. Connect recessed or lay-in lighting fixtures and all other devices installed in a lay-in ceiling to raceway runs with flexible metal conduit extending from a junction box to the fixture. Provide a ground wire in all flexible conduits.
5. Tightening set screws with pliers is prohibited.

3.5 EXPOSED WORK INSTALLATION:

A. Raceways for Conductors 600 volts and below:

1. RGS, IMC, rigid aluminum, or EMT. Types mixed indiscriminately in the system are prohibited.
2. Do not use aluminum in wet locations or in contact with concrete.
3. All raceways exposed to physical abuse and in all industrial pump, treatment plant locations shall be RGS, or IMC.

B. Raceways for conductors above 600 volts:

1. RGS or rigid aluminum. Do not use aluminum in wet locations.
2. Aluminum mixed indiscriminately with other types in the same system is prohibited.

C. Align and run raceways parallel or perpendicular to the building lines.

D. Install horizontal runs close to the ceiling or beams and secure with raceway straps.

E. Surface metallic raceways:

1. Surface metallic raceway shall only be used where shown on the drawings, and in remodels and modifications to existing where wall and ceiling voids do not permit concealed installation but shall not be used at any other location unless called for on the drawings.
2. All surface raceway and outlets must be painted to match the surface it is attached to.
3. Install a ground wire sized per NFPA 70 Section 250.122 for the largest circuit in the raceway if not already specified.

F. Painting:

1. Paint exposed raceways as specified in Section, PAINTING.
2. Paint raceways containing cables rated over 600 volts safety orange as specified in Section, PAINTING. In addition, paint legends, using 2-inch high black numerals and letters, showing the cable voltage rating. Provide legends where raceways pass through walls and floors and at maximum 20-foot intervals in between.

3.6 WET OR DAMP LOCATIONS:

- #### A. Unless otherwise shown, use raceways of RGS or IMC above grade. Use PVC conduit below grade, except RGS ells and risers shall be used.

- B. Provide sealing fittings, to prevent passage of water vapor, where raceways pass from warm to cold locations, i.e., (refrigerated spaces, constant temperature rooms, air conditioned spaces) or similar spaces.
- C. When RGS ells and risers are used below grade or when RGS or IMC conduit or RGS ells and risers are used below concrete building slabs in contact with soil, gravel, or vapor barriers, conduit shall be PVC coated RGS or PVC coated IMC.
- D. Rooftops:
 - 1. Where raceways or cables are exposed to direct sunlight on or above rooftops, raceways or cables shall be installed a minimum of 7/8" above the roof to the bottom of the raceway or cable.
 - 2. The ampacity of conductors or cables shall be de-rated in accordance with N.E.C. Section 310.15(B)(3)(c).
 - 3. Raceways or cables shall be supported up off the surface of the roof with a polymeric rooftop support equal to Caddy Pyramid series. Supports shall be non-penetrating and shall be designed to prevent damage to the roofing materials. Wood supports are not allowed.

3.7 CORROSIVE LOCATIONS:

- A. Conduit shall be PVC coated RGS.

3.8 MOTORS AND VIBRATING EQUIPMENT:

- A. Use flexible metal conduit (Type FMC) for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquid-tight flexible metal conduit Type (LFMC) for installation in exterior locations, kitchens, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, treatment plants, pump stations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with all flexible metal conduit.

3.9 EXPANSION JOINTS:

- A. Expansion fittings shall be used wherever the change in length of PVC conduit due to temperature variation exceeds 0.25-inches per NEC Section 352.44.
- B. All conduits routed outdoors or in non-conditioned spaces (i.e., attics, non-insulated plenums, etc.) shall have expansion fittings per the following:
 - 1. Steel: One expansion fitting in runs longer than 40 feet. Provide additional expansion fittings every 200 feet.
 - 2. Aluminum: One expansion fitting in runs longer than 20 feet. Provide additional expansion fittings every 100 feet.
 - 3. PVC: One expansion fitting in runs longer than 20 feet. Provide additional expansion fittings every 50 feet.

- C. Equip raceways 3-inches and larger, that are rigidly secured to the building structure on opposite sides of a building expansion joint, with expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
- D. Equip raceways smaller than 3-inches, that are rigidly secured to the building structure on opposite sides of a building expansion joint, with junction boxes located 12-inches either side of the expansion joint. Connect junction boxes with 24-inches of flexible conduit that is slack (to allow for movement). Flexible conduit shall have an insulated copper bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for 3-inches and larger conduits are acceptable.

3.10 RACEWAY SUPPORTS, INSTALLATION:

- A. All raceways shall have supports at maximum spacing of 10-feet and within 3-feet of a fitting, elbow, change of direction, box outlet or enclosure. Safe working load shall not exceed 1/4 of proof test load of fastening devices. This shall apply to both vertical and horizontal conduit runs.
- B. Use pipe straps or individual raceway hangers for supporting individual conduits.
- C. Support multiple raceway runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the raceways, wires, hanger itself, and 200 pounds. Attach each raceway with U-bolts or other approved fasteners.
- D. Support raceways independently of junction boxes; pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 1/4-inch bolt size and not less than 1-1/8 inch embedment.
 - b. Power set fasteners not less than 1/4-inch diameter with depth of penetration not less than 3-inches.
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts are permitted. Bolts supported only by plaster are not acceptable.
- G. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- H. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- I. Chair, wire, or perforated strap shall not be used to support or fasten conduit.

- J. Spring steel type supports "caddy clips" that are listed for the intended use are acceptable in appropriate locations.
- K. Vertical Supports: Vertical raceway runs shall have riser clamps and supports in accordance with NFPA 70 and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION:

- A. Boxes for Concealed Raceways:
 - 1. Mount flush. Boxes protruding from the finished wall surface or with more than 1/8-inch gap between the wall or outlet mounted in the box will be changed out with all wall reconstruction expense paid by the Electrical Contractor.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes in the same wall mounted back-to-back are prohibited.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4-inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.
- F. Where lighting fixtures and appliance outlets are to be mounted in concrete or in plaster finish on concrete, outlet boxes shall be installed in forms at exact dimensions from bench marks, columns, walls or floors.
- G. Where lighting fixtures and appliances outlets are to be mounted on masonry walls and/or plastered furring or other finish, outlet boxes shall be roughed in to general location before installation of wall and furring and shall be reset to exact dimensions before walls and furring are constructed.
- H. All outlet boxes shall be set true to horizontal and vertical lines parallel to walls, floors and ceilings and true to finish lines. All boxes shall be secured to ceilings or walls so all installations are solidly mounted.
- I. Boxes mounted to wall studs shall be secured to a horizontal box mounting bracket equal to B-Line Series #BB2 or Caddy Series #SGB. B-Line Series #BB4, Caddy Series #H23 or equal one piece support brackets may be used for mounting light switch boxes only. However, metal stud clips with far side box supports are not acceptable.
- J. Boxes for exterior exposed work (where approved by the engineer) shall be Appleton or Pyle National Type FS or FSC for shallow devices and Type FD or FDC for deep devices. Boxes for ceiling mounted light fixtures shall have approved no-bolt fixture studs. Boxes used as junction boxes shall have beveled edge flat steel blank cover.

- K. Where outlet boxes are mounted exposed in unfinished areas, (where approved by the engineer) surface mounted boxes shall be 4-inches square, have rounded corners and 1/2-inch raised steel cover plates.
 - L. Location of outlets on small drawings is approximate and exact dimensions for locations of outlets shall be as taken from large scale plans and details on drawings or as directed by the Architect/Engineer.
 - 1. Outlets shall be located generally from column centers and finished wall lines or to center of wall or joints between wall panels. Ceiling outlets shall be installed at elevation of suspended ceiling connected to outlets in ceiling or slab above. Where necessary to fit and center with panel or ceilings and wall spaces, the contractor must, at no expense the Owner, shift the lighting outlets or other outlets as required by the Architect.
 - M. Clock outlets shall be mounted 7-inches below ceiling height unless otherwise noted on the drawings. All other outlets shall be mounted at heights above floor as called for on drawings or as directed.
 - N. Bracket lights over mirrors shall be centered on mirrors with 2-inch fixture clearance above mirror.
 - O. Boxes for switches and receptacles installed in columns shall be located off center to allow for future partitions.
 - P. Boxes for switches at or near door shall be installed on the side opposite the hinge. Verify door swing direction prior to rough-in.
 - Q. To prevent sound from traveling through walls, electrical devices from different rooms shall not be mounted in the same stud place. Through-wall boxes shall not be used. In fire rated walls or partitions, outlet boxes on opposite sides of walls or partitions shall be separated by a horizontal distance of 24-inches. Outlet boxes larger than 4-inch square shall not be installed in fire rated walls or partitions. Verify location of fire rated walls or partitions with Architectural drawings prior to rough-in.
 - R. Mark all junction boxes and pull boxes and/or the conduit where it enters the box with panel designation and circuit number in permanent, black marker. Mark on the outside where located in unfinished spaces and mark on the inside in finished spaces.
 - S. Verify exact location of floor boxes and poke-throughs with Architect prior to rough-in.
- 3.12 TELEPHONE, CABLE TV, COMMUNICATIONS, SECURITY AND OTHER SYSTEMS CONDUIT:
- A. These specifications include the furnishing of all labor and materials necessary for the complete installation of a system of conduits, outlets, and boards for use by the system suppliers.
 - B. This installation must be done according to the requirements of the system suppliers and the general specifications covering "Light and Power" herewith.

- C. Provide and install pull boxes at all locations as required by the system suppliers. Mark all pull boxes and/or the conduit where it enters the box with type of system in permanent, black marker. Mark on the outside where located in unfinished spaces and mark on the inside in finished spaces.
- D. Provide and install conduit sleeves thru floors and walls as required by the system suppliers.
- E. The systems shall be provided with main service conduit sized as indicated on drawings. Each phone, data or TV location requires 1-inch empty conduit with pull rope unless noted otherwise. Conduits shall be routed to nearest associated telephone or data terminal board or above lay-in ceiling. If ceiling is an air return plenum, cables shall be routed completely in conduit or must be rated for use in air return plenum. Verify conditions of job prior to rough-in.
- F. Outlets:
 - 1. All wall outlets shall be installed with standard square box, plates furnished by system suppliers, or as directed. All outlets to be located as directed. Outlet boxes not used shall be provided with blank covers.
- G. Install the raceway system as shown on drawings.
- H. All conduit ends shall be equipped with non-metallic insulated bushings.
- I. All 2, 3 and 4-inch conduits within buildings shall include pull boxes after every two 90 degree bends. Size per NFPA 70 Article 370.
- J. Vertical conduits/sleeves through closets floors shall terminate not less than 3-inches above the floor and not less than 3-inches below the ceiling of the floor below.
- K. Terminate conduit runs to/from the associated telephone or data backboard in a closet or designated space at the top or bottom of the backboard. Conduits shall enter closets next to the wall and be flush with the backboard.
- L. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.
- M. All empty conduits located in equipment closets or on backboards shall be sealed with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.
- N. Conduit runs shall contain no more than four quarter turns (90 degree bends) between pull boxes/backboards.
- O. Furnish and install nylon pull rope in all empty conduits. (Sleeves through floor/wall are exceptions).

3.13 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 ½-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 finish grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install handholes with bottom below frost line.
- E. Where conduits enter side of enclosures, field-cut openings for conduits according to 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.

END OF SECTION

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SECTION 26 24 13
SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED PRODUCTS:

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

1.2 SUMMARY:

- A. Section includes:

- 1. Service and distribution switchboards rated 600V and less.

1.3 SUBMITTALS:

- A. Product Data: For each type of switchboard, switching and overcurrent protective device, transient voltage surge suppressor, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- B. Shop Drawings: For each switchboard and related equipment, include the following information:
 - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Enclosure type, per NEMA 250.
 - 3. Detailed bus configuration, including current and voltage ratings.
 - 4. Short-circuit current rating of switchboard and overcurrent protective devices.
 - a. Where series ratings are permitted and utilized, submit evidence of series ratings for each selected combination of fuses and/or circuit breakers.
 - 5. Evidence of NRTL listing for series rating of installed devices.
 - 6. Detailed features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Wiring diagrams for power, signal, and control wiring.
- C. Operation and Maintenance Data: Include operation and maintenance data for all switchboards and components in the operation and maintenance manuals. Data shall include, but not be limited to:
 - 1. Routine maintenance requirements for switchboards and all installed components.
 - 2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 3. Summary of final settings for all adjustable overcurrent protective devices.

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 2.1 and trained in electrical safety as required by NFPA 70E.
- B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.
- C. Product Selection for Restricted Space: Drawings may indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with any indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 2.
- F. Comply with NFPA 70.
- G. Comply with UL 891.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

1.6 COORDINATION

- A. Coordinate layout and installation of switchboards and components with adjacent work. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

1.7 PROJECT CONDITIONS:

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.
- B. Environmental Limitations:
 - 1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 104 deg F (40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).

- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions:
1. Notify Owner in writing, not fewer than seven days in advance of proposed interruption of service.
 2. Do not proceed with interruption of electric service without Owner's written permission.
 3. Comply with NFPA 70E.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 2. General Electric Company
 3. Siemens Infrastructure and Cities (Siemens IC)
 4. Square D by Schneider Electric
- B. Switchboard Accessibility:
1. Front-connected, front-accessible.
- C. Section Alignment: Sections shall be front aligned.
- D. Overcurrent Protective Device Mounting:
1. Main Devices: Fixed, individually mounted.
 2. Branch Devices: Panel mounted or fixed, individually mounted.
- E. Service Equipment Label: Where switchboard is installed as service entrance equipment, it shall be NRTL labeled for use as service entrance equipment.
- F. Switchboard Short-Circuit Current Rating:
1. Shall be rated for a minimum of 100,000 amperes rms symmetrical, unless otherwise noted. Refer to the Drawings.
 2. Switchboards shall bear a UL label indicating the integrated equipment rating.
 3. Rating Options:
 - a. Fully rated switchboards and circuit breakers.
- G. Enclosures:
1. Indoor Enclosure:
 - a. Steel, NEMA 250, Type 1.
 - b. Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

- H. Buses and Connections: Three phase, four wire unless otherwise indicated.
1. Phase- and Neutral-Bus Material: Silver- or tin-plated hard-drawn copper of 98 percent conductivity, or tin-plated, high-strength, electrical-grade aluminum alloy. Silver plating is not allowed where switchboard is installed in locations with a corrosive atmosphere.
 - a. Bus temperature rise shall not exceed 65 deg C.
 - b. Current density shall not exceed 1200 amperes per square inch for copper or 750 amperes per square inch for aluminum.
 2. Ground Bus: Material matching phase- and neutral-bus, sized as required by UL 891, equipped with connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated grounding cable to busway ground connection and support cable at intervals in vertical run.
 3. Neutral Buses: 100 percent of ampacity of phase buses unless otherwise indicated, equipped with connectors for outgoing circuit neutral cables. For busway feeders, brace bus extensions for busway feeder neutral bus.
 4. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions at both ends. Brace to withstand available fault current.
 - a. Section vertical bussing shall be sized based on the sum total of breakers served and UL derating guidelines.
 5. Bus Connections: All contact surfaces of copper or aluminum shall be plated. Provide a minimum of two plated bolts per splice. Where physical bus size permits only one bolt, provide a means other than friction to prevent turning, twisting, or bending. Make connections for aluminum bus with plated nuts and bolts with a flat plated steel washer against the bus and a cupped spring washer between the flat washer and the nut. Torque bolts to manufacturer's recommended values.
 6. Service Entrance Applications:
 - a. Main Bonding Jumper: Provide a bus connection between the neutral and ground buses to establish the system common grounding point.
 - b. Neutral Disconnect Link: Provide means to isolate the neutral bus from the common ground bus and service entrance conductors.
- I. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment. Addition of a breaker or switch in the future shall not require any additional mounting hardware.
- J. Bus Transition and Incoming Pull Sections: Where specified or necessary; matched and aligned with basic switchboard.
- K. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES:

A. Circuit Breaker:

1. Circuit Breakers shall comply with the requirements specified in Section “Overcurrent Protective Devices”.
2. Thermal-Magnetic or Non-adjustable Electronic Trip Molded Case Circuit Breakers shall be provided for all switchboard circuit breakers less than 400 amperes, unless noted otherwise.
3. Adjustable Electronic Trip Molded Case Circuit Breakers shall be provided for all switchboard circuit breakers 400 amperes through 3000 amperes, unless noted otherwise.
4. Insulated Case Circuit Breakers shall be provided for all switchboard circuit breakers larger than 3000 amperes, unless noted otherwise.

B. Fused Switch:

1. Fused switches shall comply with requirements specified in Section “Enclosed Switches and Circuit Breakers”.
2. Fuses shall comply with requirements specified in Section “Overcurrent Protective Devices”.

2.3 SWITCHBOARD SPD UNITS:

- A. Shall comply with requirements specified in Section “Surge Protective Devices for Low-Voltage Electrical Power Circuits”.

2.4 INSTRUMENTATION:

- A. Provide each switchboard with a microprocessor-based multifunction digital metering unit suitable for three- or four-wire systems.
- B. Shall have communications interface.
- C. Unit shall have a switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
1. Phase Currents, Each Phase: Plus or minus 1 percent.
 2. Phase-to-Phase Voltages: Plus or minus 1 percent.
 3. Phase-to-Neutral Voltages: Plus or minus 1 percent.
 4. Kilowatts: Plus or minus 2 percent.
 5. Kilovars: Plus or minus 2 percent.
 6. Power Factor: Plus or minus 2 percent.
 7. Frequency: Plus or minus 0.5 percent.
 8. Accumulated Energy, Kilowatt Hours: Plus or minus 2 percent; accumulated values unaffected by power outages up to 72 hours.
 9. Kilowatt Demand: Plus or minus 2 percent; demand interval programmable from five to 60 minutes.
 10. Phase Current Demand: Plus or minus 2 percent; demand interval programmable from five to 60 minutes.

- D. Display and control unit shall be flush or semiflush mounted in a hinged instrument compartment door.

2.5 CONTROL POWER:

- A. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
- B. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- B. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Equipment Mounting: Install switchboards on concrete base, 3.5" nominal thickness.
 - 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to switchboards.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.
- C. Special Operating Instructions: Where special control or key interlocking instructions or emergency procedures are required for switchboards, or where directed by the Engineer, provide a metal frame and clear acrylic plastic cover, mounted on the front of the switchboard, and install a copy of the instructions or procedures in it.
- D. Install filler plates in unused spaces of panel-mounted sections.
- E. Comply with NECA 1.

3.3 IDENTIFICATION:

- A. Identify field-installed conductors, interconnecting wiring, and components.
- B. Switchboard Nameplates: Label each switchboard compartment.
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors.

3.4 ADJUSTING:

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. All adjustable trip circuit breakers shall be, as a default, set by the manufacturer to match as closely as possible the trip curve of a fuse of the same ampacity rating (Class J fuses for 600 amperes and less, Class L for over 600 amperes). Ground fault default settings shall be minimum time delay and low pickup, and shall be field adjusted up as necessary to avoid nuisance tripping.
 - 1. Contractor may use reduced settings during construction if desired.
- C. Set final values for all field-adjustable circuit breaker trip ranges as directed by the Engineer. DEMONSTRATION
- A. Train Owner's maintenance personnel to adjust, operate, and maintain switchboards, overcurrent protective devices, instrumentation, and accessories, and to use and reprogram microprocessor-based trip, monitoring, and communication units. Training shall be a minimum of 2 hours.

END OF SECTION

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SECTION 26 24 16
PANELBOARDS

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 SUMMARY:

- A. Section includes:
 - 1. Lighting and appliance branch-circuit panelboards.
 - 2. Distribution panelboards.

1.3 SUBMITTALS:

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage surge suppressor, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment, include the following information:
 - 1. Dimensional data.
 - 2. Enclosure type, per NEMA 250.
 - 3. Detailed bus configuration, including current and voltage ratings.
 - 4. Short-circuit current rating of panelboard and overcurrent protective devices.
 - a. Where series ratings are permitted and utilized, submit evidence of series ratings for each selected combination of fuses and/or circuit breakers.
 - 5. Evidence of NRTL listing for series rating of installed devices.
 - 6. Detailed features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Layout or elevation of each panelboard showing the relative locations of all specified breakers, lugs, accessories, and features.
 - 8. Wiring diagrams for power, signal, and control wiring.
- C. Operation and Maintenance Data: Include operation and maintenance data for all panelboards and components in the operation and maintenance manuals. Data shall include, but not be limited to:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Summary of final settings for all adjustable overcurrent protective devices.
 - 3. Print or copy of all final panel schedules in 8.5" x 11" format.

- D. Test Records: Submit the following test records to the Engineer for review and approval, and include in the operation and maintenance manuals:
 - 1. Load Balancing: Submit records of load readings before and after load balancing, per paragraph ADJUSTING in Part 3 of this Section.

1.4 QUALITY ASSURANCE:

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.
- B. Product Selection for Restricted Space: Drawings may indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with any indicated maximum dimensions.
- C. 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.
- D. Comply with NEMA PB 1 and NFPA 70.

1.5 COORDINATION:

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates wall or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and requires clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of any concrete bases with actual equipment provided.

1.6 PROJECT CONDITIONS:

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner in writing, not fewer than seven days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of electric service without Owner's written permission.
 - 3. Comply with NFPA 70E.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS:

- A. All panelboard components shall be the product and assembly of the same manufacturer. All similar units of all panelboards shall be of the same manufacturer.
- B. All panelboards shall be completely factory assembled with molded case circuit breakers or switches.

- C. Panelboards shall have main breaker, main switch, or main lugs, voltage, bus sizing, and flush or surface mounting as indicated on the Drawings.
- D. Enclosures: Flush or surface mounted as indicated on the Drawings
 - 1. Rated for environmental conditions at installed location:
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Locations: NEMA 250, Type 4.
 - d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Non-corrosive Liquids: NEMA 250, Type 12.
 - 2. Cabinets:
 - a. Finish shall be galvanized steel.
 - b. Shall not have ventilation openings for panels with bus ratings of 225 amperes or less.
 - c. Back and sides shall be fabricated from one piece of formed steel for lighting and appliance branch-circuit panelboards.
 - d. Shall contain a minimum of four interior mounted studs and necessary hardware for “in” and “out” adjustment of panel interior.
 - e. Gutter sizes for cabinets containing through-feeders shall be increased by the amount required for auxiliary gutters in the NEC.
 - f. For multi-section flush-mounted panelboards, all cabinets shall be the same height.
 - 3. Front Trim:
 - a. Shall include frame and door with concealed hinges.
 - b. Shall be secured to cabinet with screws. Trim clamps are not allowed.
 - c. Shall be galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer’s standard two-coat, baked-on finish consisting of prime coat and thermosetting top coat.
 - d. Shall be same width and height as cabinet for surface-mounted panels. Shall overlap cabinet by at least 0.75 inches for flush-mounted panels.
 - e. Shall not have ventilation openings for panels with bus ratings of 225 amperes or less.
 - f. Shall include a welded angle on the rear to support and align trim to cabinet.
 - g. Shall be separate for each section of multi-section panelboards. For flush installations, trims and doors of all sections shall be the same height.
 - 4. Doors:
 - a. Shall be galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer’s standard two-coat, baked-on finish consisting of prime coat and thermosetting top coat.
 - b. Shall be provided with concealed butt hinges welded to the doors and trim.
 - c. In making switching devices accessible, doors shall not uncover any live parts.

- d. Shall have directory card holder with transparent protective cover for card, permanently mounted to inside of door.
 - e. Shall have the manufacturer's standard flush lock. All panels shall use the same key.
- E. Phase, Neutral, and Ground Buses:
 - 1. Material shall be plated copper, with copper connection straps bolted together and rigidly supported on molded insulators.
 - 2. Phase bus bars for panels with single pole branches shall be arranged for sequential phasing of branch circuit devices.
 - 3. Phase bus bar connections for breakers with trip settings of 100 amperes and less shall be arranged so that a two-pole breaker may be substituted for two single-pole breakers, and a three-pole breaker may be substituted for three single-pole breakers, without any modifications to the bus bars or connecting straps.
 - 4. Protective devices shall be able to be replaced without removing adjacent units or main bus connectors, and without drilling or tapping. Panel phase bus connections to protective devices shall be field removable by means of a screwdriver.
 - 5. Neutral bus shall be full sized. Neutral bus shall be rated for 200 percent of phase bus ampacity for panels fed from K-Factor Rated transformers and as indicated on the Drawings.
 - 6. Equipment ground bus shall be bonded to cabinet, and shall have adequate terminals and lugs for all branch circuit and feeder equipment grounding conductors.
 - 7. Isolated ground bus shall be provided when indicated on the Drawings. It shall be insulated from the cabinet, and shall have adequate terminals and lugs for all branch circuit and feeder isolated grounding conductors.
 - 8. In multi-section panelboards, the bussing in each section shall be full size. In all except the final section, provide sub-feed line-side lugs or feed-through load-side lugs for cable connections to the other sections. Sections with tapped bus or cross-over bus shall not be accepted.
 - 9. Coordinate lug quantities and sizes with the feeders serving the panel, as scheduled on the Drawings.
- F. Future Devices: Where designated on panel schedule or one-line diagram as "space" or "future", include all mounting brackets, bus connections, filler plates, and necessary appurtenances necessary for installation of devices.
- G. Panelboard Short-Circuit Current Rating:
 - 1. Refer to the Drawings for required A.I.C. ratings for each panelboard.
 - 2. Panelboards shall bear a UL label indicating the integrated equipment rating.
 - 3. Rating Options:
 - a. Fully rated panelboards and circuit breakers.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS:

- A. Shall comply with the GENERAL REQUIREMENTS FOR PANELBOARDS listed above.

- B. 240 Volt Panelboards: Subject to compliance with requirements, provide product from one of the following list of manufacturers and types:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit: PRL1A
 - 2. General Electric Company: AQ
 - 3. Siemens Infrastructure and Cities (Siemens IC): P1
 - 4. Square D by Schneider Electric: NQOD
- C. Shall comply with NEMA PB 1, lighting and appliance branch-circuit type.
- D. Branch Overcurrent Protective Devices: Shall be bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Shall have flush latch. For doors over 36" in height, provide two latches.

2.3 DISTRIBUTION PANELBOARDS:

- A. Shall comply with the GENERAL REQUIREMENTS FOR PANELBOARDS listed above.
- B. Circuit Breaker Distribution Panelboards: Subject to compliance with requirements, provide product from one of the following list of manufacturers and types:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit: PRL3A or PRL4A
 - 2. General Electric Company: Spectra-Series
 - 3. Siemens Infrastructure and Cities (Siemens IC): P4 or P5
 - 4. Square D by Schneider Electric: I-Line
- C. Shall comply with NEMA PB 1, power and feeder distribution type.
- D. Branch Overcurrent Protective Devices:
 - 1. For circuit breaker distribution panelboards, shall be circuit breakers, replaceable without disturbing adjacent units.
 - 2. For fusible distribution panelboards, shall be fused switches.
- E. Cabinet Finish: May be factory primed and suitable treated with a corrosion-resisting paint finish meeting applicable UL standard for outdoor applications.
- F. Doors:
 - 1. Shall be provided where distribution panelboards are installed in finished rooms.
 - 2. Shall have a vault-type latch with three-point catch arranged to fasten door at top, center, and bottom.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES:

- A. Molded Case Circuit Breaker (MCCB):
 - 1. Molded Case Circuit Breakers shall comply with the requirements specified in Section "Overcurrent Protective Devices".

2. Circuit breakers shall be factory-installed in the panelboards in the same numbered positions indicated on the Drawings.
3. Thermal-Magnetic or Non-Adjustable Electronic Trip Molded Case Circuit Breakers shall be provided for all panelboard circuit breakers less than 400 amperes, unless noted otherwise.
4. Adjustable Electronic Trip Molded Case Circuit Breakers shall be provided for all panelboard circuit breakers 400 amperes and larger, unless noted otherwise.
5. Where indicated on the drawings breaker shall be provided with a handle blocking clip, allowing the breaker to be blocked in the "ON" position.

B. Fused Switch:

1. Fused switches shall comply with requirements specified in Section "Enclosed Switches and Circuit Breakers".
2. Fuses shall comply with requirements specified in Section "Overcurrent Protective Devices".

2.5 SURGE PROTECTIVE DEVICES:

- A. Shall comply with requirements specified in Section "Surge Protective Devices for Low-Voltage Electrical Power Circuits".

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- B. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Where indicated on the Drawings, install panelboards on concrete bases, in addition to attaching them to the vertical finished or structural surface behind the panelboard.
- B. Install wall-mounted panelboards so that the maximum height of the highest circuit breaker or switch above the finished floor does not exceed 78 inches. The bottom of the cabinet shall not be less than 6 inches above the finished floor.
- C. Mount panelboard cabinet plumb and rigid, without distortion of the box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Arrange panelboard sections for easy removal without disturbing other sections. Locate sections so that present and future conduits can be conveniently connected. Coordinate sizes of cabinets with the designated installation space.

- E. Where flush-mounted panelboards are specified, install one 3/4-inch empty conduit into an accessible ceiling space for every three single-pole spare breakers or breaker spaces, for future use.
- F. Multi-section panelboards shall be coupled together by conduit nipples appropriately sized for all feeder wiring installed between the sections.
- G. Where multi-section panelboards are flush-mounted, sections shall be arranged side by side and shall be 1.5 inches apart.
- H. Arrange conductors in gutters into neat groups and bundle and wrap with nylon cable ties.
- I. At the direction of the Architect or Engineer, where panelboards are installed in public areas, paint the exposed surfaces of the trims, doors, and cabinets to match surrounding wall finishes after the panelboards are installed.

3.3 IDENTIFICATION

- A. Identify all field-installed conductors, interconnect wiring, and components.
- B. Panelboard Nameplates: Label each panelboard with a nameplate as indicated on the Drawings and as specified elsewhere.
- C. Create a type-written schedule of circuits in each panelboard, after approval of the Engineer, and install in the directory holder in each panelboard.
 - 1. Circuit descriptions shall include final room numbers, room descriptions, and items or equipment served.
 - 2. Spare breakers and breaker spaces shall be neatly marked in pencil, to allow for future updates of the schedule.
 - 3. Schedules shall be typed on paper directory cards, or printed on card stock appropriately sized for the directory sleeves provided on the panel door.

3.4 ADJUSTING:

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Load Balancing: If the contractor modifies the circuiting arrangement from what is shown on the plans, the contractor shall be responsible for balancing the loads between phases. The maximum difference of load between phases shall not exceed 20%. Submit calculations to the engineer for review.
- C. All adjustable trip circuit breakers shall be, as a default, set by the manufacturer to match as closely as possible the trip curve of a fuse of the same ampacity rating (Class J fuses for 600 amperes and less, Class L for over 600 amperes). Ground fault default settings shall be minimum time delay and low pickup, and shall be field adjusted up as necessary to avoid nuisance tripping.
 - 1. Contractor may use reduced settings during construction if desired.

- D. Set final values for all field-adjustable circuit breaker trip ranges as directed by the Engineer.

END OF SECTION

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SECTION 26 28 10
OVERCURRENT PROTECTIVE DEVICES

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. Cartridge fuses rated 600 VAC and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers, and motor control centers.
 - 2. Plug fuses rated 125 VAC and less for use in enclosed switches and fuseholders.
 - 3. Spare fuse cabinets.
 - 4. Molded Case Circuit Breakers (MCCBs)
 - 5. Insulated Case Circuit Breakers (ICCBs)
 - 6. Molded Case Switches

1.3 DEFINITIONS:

- A. ICCB: Insulated Case Circuit Breaker
- B. MCCB: Molded Case Circuit Breaker

1.4 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, and descriptions of individual components.
 - 1. Dimensions and manufacturer's technical data on features, performance, and electrical characteristics.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (both interrupting and withstand, as appropriate).
 - 4. Evidence of UL listing for series rating of installed devices.
- B. Operation and Maintenance Data:
 - 1. Manufacturer's written instructions for testing, operating, and adjusting overcurrent protective devices.
 - 2. Summary of final settings for all adjustable overcurrent protective devices.
- C. Performance Testing: For each system requiring performance testing, submit a written record of the test results and include with the associated system's Operations and Maintenance Data.

1. For arc energy reduction system testing methods other than primary current injection, submit a Performance Testing Plan with the associated Product Data submittal for review and approved by the Architect/Engineer. Test results obtained from testing methods other than primary current injection will not be accepted without Architect/Engineer pre-approval.

1.5 QUALITY ASSURANCE:

- A. Source Limitations: Obtain overcurrent protective devices, components, and accessories, within same product category, through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for the intended locations and application.
- C. Comply with NFPA 70.
- D. Comply with NEMA FU 1 for cartridge fuses.
- E. Comply with UL 248-11 for plug fuses.
- F. Comply with UL 489 for circuit breakers.

1.6 COORDINATION:

- A. Coordinate overcurrent protective device ratings with utilization equipment nameplate limitations of maximum fuse and/or breaker size and with system short-circuit current levels.
- B. Final fuse sizes for mechanical and other motor loads shall be selected by the fuse manufacturer to provide Type-2 “no damage” protection for equipment served. Contractor shall provide and install the selected fuses.

1.7 EXTRA MATERIALS:

- A. Furnish extra materials that match products installed and that are packaged in protective covering for storage and identified with labels describing contents.
 1. Fuses: Equal to 10 percent of quantity of installed fuses for each size and type but no fewer than three for each size and type.

PART 2 - PRODUCTS

2.1 FUSES:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 1. Cooper Bussmann, Inc.
 2. Edison Fuse, Inc.
 3. Mersen Electrical Power
 4. Littelfuse, Inc.

B. Cartridge Fuses:

1. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
2. Fuse Classes:
 - a. Class-CC: UL 248-4, time-delay, rejection type
 - b. Class-J: UL 248-8, dual-element, time-delay
 - c. Class-L: UL 248-10, dual-element, time-delay

C. Plug Fuses:

1. Characteristics: UL 248-11, dual-element, time-delay, Edison base.

2.2 SPARE FUSE CABINET:

- A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
- B. Size: Adequate for storage of all spare fuses specified with 20 percent minimum extra spare capacity.
- C. Finish: Gray, baked enamel.
- D. Identification: Engraved nameplate to read "SPARE FUSES" in 1.5" high letters on exterior of door.
- E. Fuse Pullers: Provide for each size and type of fuse, where applicable and available, from the fuse manufacturer.

2.3 MOLDED-CASE CIRCUIT BREAKERS:

- A. Shall be provided as factory installed components of panelboards or switchboards, or as separately enclosed units, as specified in other Sections or on the Drawings.
- B. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 2. General Electric Company
 3. Siemens Infrastructure and Cities (Siemens IC)
 4. Square D by Schneider Electric
- C. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- D. Standard Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Line connections shall be bolt-on.
 3. Lugs: Mechanical type, suitable for the trip rating, number and size of conductors, and conductor material.

4. Multi-pole units shall be enclosed in a single housing or be factory-assembled to operate as a single unit. They shall have a trip element for each pole, a common trip bar for all poles, and a single operator.
 5. Operating handle shall indicate ON, TRIPPED, and OFF positions.
 6. Shall be 80% rated, unless 100% rating is shown on the Drawings or is otherwise specified.
 7. Application Listing: Appropriate for application:
 - a. Type SWD for switching fluorescent lighting loads.
 - b. Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - c. Type HACR for feeding heating, air conditioning, and refrigeration equipment.
- E. Optional Features and Accessories: Provide where indicated on the Drawings or otherwise specified.
1. Ground-Fault Protection: Relay and trip unit with push-to-test feature.
 2. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
 3. Handle Padlocking Device: Fixed attachment, for padlocking circuit-breaker handle in off position.
 4. Shunt Trip: 120-Volt trip coil energized from separate circuit, set to trip when at least 75% of coil voltage is applied, with coil clearing contact.
 5. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts; "b" contacts operate in reverse of circuit-breaker contacts.
 6. Key Interlock Kit: Externally mounted to prohibit circuit breaker operation; key shall be removable only when circuit breaker is in off position.
 7. Alarm Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit breaker contacts; "b" contacts operate in reverse of circuit breaker contacts.
- F. Thermal-Magnetic (or Non-Adjustable Electronic Trip) Circuit Breakers:
1. Shall have inverse time element for low-level overloads.
 2. Shall have instantaneous magnetic trip element for short circuits.
 3. Shall have front-mounted, field-adjustable magnetic trip setting for circuit-breaker frame sizes 250 amperes and larger. Factory setting shall be LO, unless otherwise noted.
- G. Adjustable Electronic Trip Circuit Breakers:
1. Shall have RMS sensing.
 2. Shall have field replaceable rating plug and field replaceable electronic trip unit.
 3. Shall have the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long-time delay and pickup levels.
 - c. Short-time delay and pickup levels.
 - d. Ground-fault pick-up level, time delay, and I_{2t} response.

- 1) Ground fault functions shall not be provided on systems operating at less than 150 volts to ground unless specifically noted otherwise.
 4. Shall have a digital current ammeter.
 5. Shall have a trip test button to provide a means to manually trip the breaker.
 6. Shall have permanently installed provisions for padlocking the breaker in the open position.
 7. Field adjustable settings shall be protected by a transparent cover.
 8. Shall have communications interface.
 9. For circuit breakers that require power or minimum power flow to the trip unit in order to make settings, provide portable battery power unit so settings can be made during no power or low power flow situations.
- H. Current-Limiting Circuit Breakers: Frame sizes 400 amperes and smaller; shall have let-through ratings less than NEMA FU 1, RK-5.
- I. Ground-Fault Circuit Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (5-mA trip) with self-test circuitry.
- J. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
- K. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-Volt, single pole configuration.
- L. Each circuit breaker installed between an emergency generator and an automatic transfer switch, including generator-mounted circuit breakers, shall be provided with auxiliary and alarm contacts as specified above as required to monitor circuit breaker for open and tripped status. Contact status of all such breakers shall be monitored by the generator monitoring system and shall be annunciated at the generator and all remote annunciating panels as an alarm, with a flashing red light, reading "Open/Tripped Circuit Breaker".
- M. Circuit Breakers and/or Trip Units Rated 1200 Amp and Larger: Provide an energy-reducing maintenance switching system to temporarily reduce the instantaneous pickup setting of the circuit breaker. Provide all components as required for a fully functional system. All components shall be clearly labeled. The energy-reducing maintenance switching system shall consist of the following:
1. Energy reduction maintenance setting switch.
 2. Blue status light to indicate energy-reducing maintenance system is active.
- 2.4 INSULATED CASE CIRCUIT BREAKERS:
- A. Shall be provided as factory installed components of switchboards or switchgear, as specified in other Sections or on the Drawings.
- B. General Requirements: Shall comply with UL 489, UL 891, and applicable NEMA and NEC requirements.

- C. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 2. General Electric Company
 3. Siemens Infrastructure and Cities (Siemens IC)
 4. Square D by Schneider Electric
- D. Insulated Case Circuit Breaker (ICCB) Features and Accessories:
1. Shall be a sealed, insulated-case power circuit breaker, manually operated, with interrupting capacity to meet available fault current.
 2. Shall have a two-step, stored energy closing mechanism.
 3. Shall have a minimum short-time (30 cycle) withstand rating of 42,000 amperes.
 4. Shall be 100% rated.
 5. Shall have fixed mounting, unless draw-out construction is shown on the Drawings or is otherwise specified.
 6. Shall have provisions for padlocking the breaker in the open position.
 7. Shall have a full function, microprocessor-based trip unit with interchangeable rating plug, trip indicators, and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long-time delay and pickup levels.
 - c. Short-time delay and pickup levels.
 - d. Ground-fault pick-up level, time delay, and I²t response.
 - 1) Ground fault functions shall not be provided on systems operating at less than 150 volts to ground unless specifically noted otherwise.
 8. Shall have a trip test button to provide a means to manually trip the breaker.
 9. Shall have communications interface.
 10. Where indicated on the Drawings or otherwise specified, shall have an externally mounted key interlock kit to prohibit circuit breaker operation. Key shall be removable only when circuit breaker is in off position.
- E. Each circuit breaker installed between an emergency generator and an automatic transfer switch, including generator-mounted circuit breakers, shall be provided with auxiliary contacts as specified above. Contact status of all such breakers shall be monitored by the generator monitoring system and shall be annunciated at the generator and all remote annunciating panels as an alarm, with a flashing red light, reading "Open/Tripped Circuit Breaker".
- F. Circuit Breakers and/or Trip Units Rated 1200 Amp and Larger: Provide an energy-reducing maintenance switching system to temporarily reduce the instantaneous pickup setting of the circuit breaker. Provide all components as required for a fully functional system. All components shall be clearly labeled. The energy-reducing maintenance switching system shall consist of the following:
1. Energy reduction maintenance setting switch.
 2. Blue status light to indicate energy-reducing maintenance system is active.

2.5 MOLDED-CASE SWITCHES:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 2. General Electric Company
 - 3. Siemens Infrastructure and Cities (Siemens IC)
 - 4. Square D by Schneider Electric
- B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame interrupting rating.
- C. Features and Accessories:
 - 1. Standard frame sizes and number of poles.
 - 2. Lugs: Suitable for the trip rating, number and size of conductors, and conductor material.
 - 3. Provide the following options or accessories where indicated on the Drawings or otherwise specified:
 - a. Shunt Trip: 120-Volt trip coil energized from separate circuit, set to trip at 75 percent of rated voltage, with coil clearing contact.
 - b. Auxiliary Contacts: Two SPDT switches with “a” and “b” contacts; “a” contacts mimic circuit-breaker contacts; “b” contacts operate in reverse of circuit-breaker contacts.
 - c. Key Interlock Kit: Externally mounted to prohibit circuit breaker operation; key shall be removable only when circuit breaker is in off position.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine overcurrent protective devices before installation. Reject units that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install overcurrent protective devices of sizes and with characteristics appropriate for each piece of equipment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS:

- A. Cartridge Fuses:
 - 1. Service Entrance: Class-J for up to 600 A; Class-L for over 600 A

2. Feeders: Class-J for up to 600 A; Class-L for over 600 A
3. Motor branch circuits: Class-J for up to 600 A; Class-L for over 600 A
4. Single-phase motor and other branch circuits where appropriate fuse holders are specified in other Sections: Class-CC

B. Plug Fuses:

1. Motor and other branch circuits: Edison-base type.

3.3 CIRCUIT BREAKER APPLICATIONS:

- A. Refer to applicable Drawings and Specification Sections for information on types of circuit breakers to be installed in particular applications. Applicable Sections may include, but not be limited to, "Switchboards", "Panelboards", and "Enclosed Switches and Circuit Breakers".

3.4 INSTALLATION:

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install spare fuse cabinet(s) in locations as indicated on the Drawings.

3.5 IDENTIFICATION:

- A. Install labels complying with requirements found on the Drawings and elsewhere in this Specification. Install labels at every fused switch and each fuse block, socket, or holder which indicate fuse replacement information

3.6 PERFORMANCE TESTING

- A. Arc Energy Reduction: Arc energy reduction protection systems shall be performance tested when first installed on site by primary current injection testing or another approved method in accordance with NFPA 70. Submit a written record of this testing in accordance with paragraph SUBMITTALS.
- B. Service Disconnect Ground-Fault Protection: The ground-fault protection system shall be performance tested when first installed on site by primary current injection testing in accordance with NFPA 70. Submit a written record of this testing in accordance with paragraph SUBMITTALS.

END OF SECTION

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SECTION 262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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. Fusible Switches
 - 2. Nonfusible Switches
 - 3. Shunt Trip Switches
 - 4. Enclosed Circuit Breakers
 - 5. Enclosures

1.3 DEFINITIONS:

- A. NC: Normally closed
- B. NO: Normally open

1.4 SUBMITTALS:

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, factory setting, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work. Include wiring diagrams for power, signal, and control wiring.
- C. Operation and Maintenance Data: Include operation and maintenance data for all enclosed switches and circuit breakers in the operation and maintenance manuals. Data shall include, but not be limited to:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.5 QUALITY ASSURANCE:

- A. Source Limitations: Obtain enclosed switches and circuit breakers, components, and accessories, within same product category, through one source from a single manufacturer.

- B. Product Selection for Restricted Space: Drawings may indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for the intended locations and application.
- D. Comply with NFPA 70.

1.6 COORDINATION:

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and requires clearances for equipment access doors and panels.

1.7 PROJECT CONDITIONS:

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner in writing, not fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of electric service without Owner's written permission.
 - 3. Comply with NFPA 70E.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 - 1. Allen-Bradley; Rockwell Automation
 - 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 3. Eaton Electrical Inc.; Pringle Business Unit
 - 4. General Electric Company
 - 5. Siemens Infrastructure and Cities (Siemens IC)
 - 6. Square D by Schneider Electric
- B. Type GD General Duty switches are not allowed, unless specifically noted otherwise.
- C. Type HD, Heavy Duty, Single Throw, 1200A and smaller: UL 98 and NEMA KS 1.
 - 1. Shall be horsepower rated for the load served.
 - 2. Shall have clips or bolt pads to accommodate the specified fuses, with rejection features to reject fuses other than those specified.
 - a. Refer to Section "Overcurrent Protective Devices" for specified fuse types.

3. Shall have an external operating handle indicating ON and OFF positions, with provisions to padlock the switch in the OFF position.
 4. Shall have a mechanical interlock to prevent the opening of the cover unless the handle is in the OFF position. This interlock shall be defeatable with a special tool to permit inspection.
 5. Shall have an equipment ground kit. Equipment ground shall be internally mounted and labeled for copper and aluminum ground conductors.
 6. Accessories: Provide where indicated on the Drawings or required to complete the intended design.
 - a. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - b. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - c. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact arranged to activate before switch blades open.
 - d. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - e. Service Entrance Rating: Labeled for use as service entrance equipment.
- D. Other specialty switch types, such as Six Pole or Double Throw, shall be provided where indicated on the Drawings or as necessary for the equipment served, and shall meet the requirements for Type HD single throw switches above.
- E. Bolted Pressure Contact Switch: Heavy Duty, Single Throw, Larger than 1200A: UL 98 and NEMA KS 1.
1. Shall meet all the requirements for Type HD switches as specified above, except as modified below.
 2. Shall have an operating mechanism using a rotary-mechanical-bolting action to produce and maintain high clamping pressure on the switch blade after it engages the stationary contacts.
 3. Shall use manual handle operation to close switch, which stores energy in mechanism for opening and closing.
 4. Operation of a mechanical lever, push button, or other device shall cause the switch to open.
 5. Shall be available with a factory-installed ground fault protection system.
 - a. Provide ground fault protection system where indicated on the drawings or required by NFPA 70.
 6. Shall have arc tips which are independent of the main contacts.
 7. Shall maintain positive wiping pressure on the contacts during opening and closing operations of the switch.
 8. Shall be designed so that the switch blades and fuses are de-energized with the switch open.
 9. Shall be capable of withstanding and being closed against a 200,000 A fault in a three-phase circuit with fuses in place.
 10. Shall have a main contact interrupting capability of 12 times the switch current rating.
 11. Shall not allow manual opening or closing of the switch while the door is open.

2.2 NONFUSIBLE SWITCHES:

- A. Shall meet all requirements for FUSIBLE SWITCHES above, except that they shall not accept fuses.

2.3 SHUNT TRIP SWITCHES:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 - 1. Cooper Bussmann, Inc.
 - 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 3. Mersen Electrical Power.
 - 4. Littelfuse, Inc.
- B. General Requirements: Comply with UL 50 and UL 98. Switches used in conjunction with elevators shall also comply with ASME A17.1.
- C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class-J fuse block; padlockable handle interlocked with cover in closed position.
- D. Control Circuit: 120-VAC, obtained from an integral control power transformer, with primary and secondary fusing, sized adequately to provide power to operate shunt trip, pilot lights, and indicating and control devices.
- E. Standard Features:
 - 1. Oil-tight key switch for key-to-test function.
 - 2. Oil-tight green ON pilot light.
 - 3. Full capacity isolated neutral lug (where specified on the Drawings or necessary to achieve the intended function).
- F. Elevator Applications: Where switches are installed to serve elevator machines, provide the following accessories:
 - 1. Mechanically interlocked auxiliary contacts that change state when switch is opened or closed.
 - 2. Form "C" alarm contacts that change state when switch is tripped.
 - 3. Three-pole, double-throw, fire safety and alarm relay, 24 VDC coil voltage. Verify coil voltage with fire alarm system.

2.4 ENCLOSED CIRCUIT BREAKERS:

- A. Circuit breakers shall comply with Section "Overcurrent Protective Devices".
 - 1. Shall be Thermal-Magnetic or Non-adjustable Electronic Trip Molded-Case for breakers less than 400 amperes, unless noted otherwise.
 - 2. Shall be adjustable Electronic Trip Molded-Case for breakers 400 amperes and larger, unless noted otherwise.

2.5 ENCLOSURES:

- A. Comply with NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50.
- B. Enclosure Types: Shall be compatible with environmental conditions at installed locations, unless more stringent requirements are specified on the Drawings or elsewhere in the Specifications.
 - 1. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Other Wet or Damp Corrosive Locations: NEMA 250, Type 4X Non-Metallic.
- C. Finished Spaces: In finished spaces, enclosures shall be flush mounted unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated. Maximum mounting height and required working clearances shall comply with NFPA 70.
- B. Install fuses in fusible devices.
 - 1. Where fuses serve utilization equipment or motors, coordinate final fuse sizes with equipment nameplates and comply with listed minimum and maximum sizes.
 - 2. Plug fuses installed in fustats shall be sized for 125 percent of the nameplate full load amps or running load amps.
- C. Comply with NECA 1.

3.3 IDENTIFICATION:

- A. Identify field-installed conductors, interconnecting wiring, and components.
- B. Label each enclosure with engraved nameplate.

3.4 ADJUSTING:

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit breaker trip ranges.

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SECTION 263213
GENSETS AND ACCESSORY EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE:

- A. This specification covers requirements for providing a complete and operable electric generating system, including all devices and equipment specified herein, shown on the drawings, and/or as required for the service. Materials and equipment shall be new, and delivered to the site completely wired, tested, and ready for installation. Each system shall include the following:
 - 1. Engine-generator set as shown on the drawings and as herein specified.
 - 2. Engine-generator control console resiliently mounted on each generating set shall include complete engine start-stop control and solid-state monitoring system.
 - 3. Automatic transfer switch as specified in Section AUTOMATIC TRANSFER SWITCHES.
 - 4. Mounted and loose accessories, control devices, and other equipment as specified herein and/or as shown on drawings.
 - 5. Such other components, accessories, parts, tests, documents, and services, as needed to meet the performance requirements of this specification.
- B. The equipment and services specified herein shall be provided by a single supplier who has been regularly engaged in the sales and service of engines, generators, generator sets, transfer switches, and controls for a minimum of ten years. The emergency electric generating system described herein, including those components along with the engine auxiliaries shall be factory built, factory tested, and shipped by this single supplier, so there is one source of supply and responsibility for warranty, parts, and service. Supplier shall maintain a service and maintenance facility within 50 miles of jobsite.
- C. The responsibility for performance to this specification in its entirety cannot be split up among individual suppliers of components comprising the system but must be assumed solely by the local authorized dealer of the generator set manufacturer. Specifically, note requirements for total system testing, equipment coordination and documentation.
- D. The system supplier shall provide literature and other information describing the equipment specified; data and other information shall be on the manufacturer's printed literature or letter head. Performance data shall be the result of test procedures in accordance with nationally recognized standards, in addition to such other procedures that are judged necessary by the manufacturer to ensure maximum service reliability for emergency systems and shall be available for inspection by the Engineer upon request.

1.2 SUBMITTALS:

- A. The following information must be submitted for approval per Section 01 33 00.
- B. Outline drawings of the equipment showing overall dimensions, power and control wiring entrance locations, breaker sizes and locations, lug sizes and locations, and front panel drawings showing all devices to be provided, with each device referenced to a material list with a complete description for the device.

- C. Interconnection detail drawing showing all control and power connections in the entire emergency system. Control connections between components are to be labeled with identical nomenclature.
- D. Literature describing in detail the equipment proposed, and all possible operating modes.
- E. A complete review of this specification, noting for each paragraph whether the proposed equipment complies with the project specifications, or deviates in some fashion. For each deviation, a justification for that deviation must be given.
- F. Complete test specification detailing the testing procedure to be used to verify the performance of the equipment provided.
- G. On the request of the project engineer, the manufacturer shall provide a complete set of operation manuals for the equipment proposed, at the time of the submittal for the Engineer's review and approval.
- H. Submit generator sizing calculations based on the loads and steps indicated on the drawings and/or in this specification. Include the following:
 - 1. Steps/Loads detail report to include loads on each step and the generator load requirements for each step.
 - 2. Voltage dip and frequency dip per step.
 - 3. Recommended generator report indicating generator performance and load requirements.

1.3 INSTRUCTIONS, DRAWINGS, PARTS, AND OPERATION INFORMATION:

- A. Two copies of complete instructions shall be supplied to Owner prior to final acceptance per Section 01 78 23.
- B. Material shall be in booklet form and shall consist of operating and maintenance manuals, parts manuals, dimensional drawings, wiring diagrams and schematics, interconnection wiring diagrams, and necessary information for proper operation, service, and maintenance of the equipment and major components supplied.

1.4 WARRANTY:

- A. The complete standby electric power system, including engine-generator set, and automatic transfer switches shall be warranted for a period of five (5) years or fifteen hundred (1,500) operating hours, whichever occurs first, from the date of initial start-up.
- B. Warranty shall cover 100 percent of all parts and labor for the full warranty period. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable.
- C. Satisfactory warranty documents must be provided with submittal documentation. In the judgment of the specifying authority, the manufacturer supplying the warranty for the complete system must have necessary financial strength and technical expertise with all components supplied to provide adequate warranty support.

- D. The installing contractor shall be responsible for changes in the building work, made necessary from the installation of equipment other than specified, without additional cost to the Owner. (Verify all work with the equipment manufacturer.)

1.5 CODES AND STANDARDS:

- A. The complete emergency power system, as installed, shall comply with all applicable local, state, and national standards. In particular, the equipment shall comply with the requirements of NFPA 99, and NFPA 110 for level 1 systems.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS:

- A. Cummins/Onan
- B. Caterpillar
- C. MTU Onsite Energy
- D. Generac
- E. Kohler

2.2 LAYOUT AND DESIGN:

- A. The equipment spacing, mounts, electrical wiring, ventilation equipment, fuel, and exhaust components have all been sized and designed around a single manufacturer's equipment.

2.3 PERFORMANCE:

- A. Ambient conditions and altitude for this project shall be:
 - 1. 110 degrees F
 - 2. 29.92 inches Hg (101 Kpa) barometric pressure
 - 3. 1000 ft. elevation.
- B. Sound Attenuation:
 - 1. Enclosure shall be sound attenuated and silencer shall be rated to reduce the sound level of the engine generator and exhaust combined while operating at full load to a maximum of 78 dB(A) measured at any location 23 feet from the engine.
- C. The generator set shall provide kW and KVA for an unlimited period of time under specified altitude and ambient conditions for all standby applications.
- D. The output of the generator set with specified governor and voltage regulator shall meet the following requirements:
 - 1. Random frequency variation will not exceed +/-0.5 percent (+/-0.3Hz) of its mean value for constant loads, no load to full load.

2. Random voltage variation will not exceed ± 0.5 percent of it's for constant loads, from no load to full load.
3. Frequency regulation under varying loads from no load to full load shall be isochronous.
4. Voltage regulation under varying loads from no load to full load shall not exceed ± 1.0 percent.
5. On application of maximum demand kW and KVA step as described below or on drawings, unit shall recover to stable operation and rated conditions within 10 seconds. Maximum voltage dip under these conditions shall not exceed 15 percent.
6. Manufacturers of Generators shall submit calculations with marked data indicating generators will start the following items and still maintain voltage as identified above. Manufacturers shall increase kW rating of their unit if required by loads. Sizing shall be at the system voltage.
 - a. In the event approved manufacturers require larger kW generator sizes than specified to meet loading requirements as listed above or on the drawings, the Electrical Contractor shall include in the bid amount required to increase feeder, transfer switch, main switchboard switch, distribution panel sizes, etc., as required for the increased kW size of the generator to be provided. These changes shall be made with no increased cost to the Owner after the bid date. The Electrical Contractor shall submit with the generator shop drawings new feeder, switch, and panel sizes for approval by the engineer. The generator shop drawings shall be submitted prior to shop drawing submittal of the service and distribution equipment and any changes required to the equipment because of increased generator sizes shall be reflected on the equipment shop drawings prior to submittal to the Engineer.

2.4 ENGINE-GENERATOR SET DESIGN:

- A. General: Each generator-set shall be mounted on suitable welded steel base to maintain proper alignment between components.
- B. Engine:
 1. Engine shall be stationary, natural gas. Design shall be two or four cycle. Engine shall be certified by manufacturer as capable of driving a generator of kW rating as specified herein, for an unlimited time, in a standby application.
 2. Engine shall be capable of driving the generator of this rating under specified altitude and ambient conditions.
 3. Arranged for direct connection to the alternating current generator.
- C. Engine equipment shall include:
 1. Remote two-wire, negative ground, 12/24 V.D.C. starting system. Provide electric starter, with two independent systems to disconnect the starting circuit upon engine starting.
 2. Positive displacement, mechanical, full pressure lubrication oil pump with pressure regulation valve, full flow oil filters with replaceable elements, integral oil cooler, dipstick oil level indicator, oil drain valve with hose extension.

3. Primary and secondary fuel filters with replaceable elements, automatic shutoff all mounted on the engine. Replaceable dry element air cleaner.
4. Provide all electronic, isochronous governor for isochronous frequency regulation. Frequency shall be regulated within .5% of any constant load condition from 0 to 100% of rated load.
5. Necessary protective devices and engine gauges shall have sensing elements located on the engine to interface with the generator set control; as specified under "Engine-Generator Control" herein.
6. 35 Amp battery charging alternator with transistorized voltage regulator.
7. Engine mounted, tank-type, engine coolant heaters, single-phase, 208 VAC, sized to ensure generator meets starting and load acceptance requirements of this specification, shall be provided for each engine. Contractor shall provide proper branch circuit(s).
8. Engine protective devices shall include over cranking protection, low oil pressure, high coolant temperature, and overspeed shutdown.
9. Battery heater/warming pad to maintain battery temperature.
10. 120V Alternator anti-condensation heater.
11. All generator accessories shall be powered from normal utility power service.

2.5 ENGINE COOLING SYSTEMS:

- A. Engine shall be radiator cooled by a skid mounted radiator system. Genset cooling system shall be designed to allow operation of the genset at rated load under specified altitude and ambient conditions.
- B. Provide manufacturer-recommended antifreeze solution to fill entire cooling system.
- C. The system shall include, unit mounted radiator, blower fan, water pump, thermostat and radiator duct fan.

2.6 ENGINE EXHAUST SYSTEM:

- A. Exhaust silencer shall be provided for each engine of size as recommended by manufacturer. Silencer shall be chambered construction. Contractor shall mount silencer, so its weight is not supported by the engine. Silencer shall be mounted as close as is practical to the engine.
- B. Flexible seamless stainless-steel exhaust connection shall be provided as required for connection between engine exhaust manifold and exhaust line (24" minimum).
- C. Provide an exhaust condensation trap with manual drain valve to trap and drain off exhaust condensation and to prevent condensation from entering the engine.
- D. Provide all necessary flanges and special fittings, etc. for proper installation.
- E. Contractor shall mount and install all exhaust components as shown on drawings and as required for code compliance. All components shall be properly sized to assure proper operation without excessive back pressure when installed as shown on drawings.
- F. Make provisions as required for pipe expansion and contraction.

- G. Contractor shall cover exhaust silencer and all indoor exhaust piping with a proper insulating material in a manner not to interfere with flexible exhaust connections.
- H. Thickness and type of insulation shall be shown on mechanical drawings.

2.7 ENGINE FUEL SYSTEMS:

- A. The manufacturer shall provide and warrant the complete fuel delivery system. Provide all required items including flexible connection, solenoid valve. Pressure regulator by Plumbing Contractor. Solenoid valves shall be powered from battery voltage.

2.8 GENERATOR:

- A. Generator shall be single-bearing, drip-proof construction, synchronous type, revolving field, with direct drive centrifugal blower for cooling and minimum noise. Stator shall be skewed design and twice impregnated with high-temperature polyester varnish. Insulation shall be Class F or Class H per NEMA MG1.65 and BS 2757. Generator shall be directly connected to engine flywheel housing. Rotor shall be driven through a flexible coupling to insure permanent alignment. The maximum temperature rise at rated load shall not exceed 80 degrees C at 40 degrees C ambient (for Class F insulation) or 105 degrees C (for Class H insulation).
- B. Voltage regulator:
 - 1. Regulator shall be three phase sensing, solid-state temperature compensated design and shall function by controlling the exciter magnetic field between stator and rotor. The voltage regulation system shall be insensitive to severe, load induced waveshape distortion from SCR or thyristor circuits such as those used in battery charging (UPS) and motor speed control equipment loads. Voltage regulator shall be mounted in the genset control panel.
 - 2. Voltage regulation system shall include overvoltage protection to protect the system against voltage regulator failure or loss of reference, and to protect the system loads from damaging overvoltage conditions.
 - 3. Voltage regulation system shall include permanent magnet exciter (PMG), to provide 250% of rated current for 10 seconds without damage to generator. After 10 seconds the generator field shall collapse to protect genset to switchgear power connections.
- C. The alternator, exciter, and voltage regulator shall be designed and manufactured by the generator set manufacturer so that the characteristics shall be matched to the torque curve of the prime mover. System shall provide automatic voltage reduction if the load demand exceeds the engine capacity to prevent engine stalling and saturation of magnetic components.

2.9 ENGINE-GENERATOR CONTROL:

- A. Provide a unit mounted control console that is factory built, wired, tested, and shock-mounted by the engine and generator manufacturer. Control console shall be mounted on the generator end of the set. Control wire shall have termination identification on each wire for ease of tracing. Control wires which run between generator set controls, and automatic load transfer controls shall have termination identification on both ends.

Nameplates shall be provided to identify each device or function and shall be silk-screened white on a black background. The genset shall be capable of independent operation, without any control from remote equipment. Control panel shall meet NFPA 110.

- B. Engine-generator control shall include the following DC engine controls for each unit: Run-stop-remote switch; remote start-stop terminals; lighted oil pressure gauge; lighted coolant temperature gauge; lighted battery charge rate ammeter; running time meter, AC voltmeter (dual range), AC ammeter (dual range) volt/Amp phase selector switch with off position, frequency meter 45-66 HZ, voltage adjusting rheostat ($\pm 5\%$ range). Digital meters may be used.
- C. All wiring for connection to remote devices shall be wired to properly numbered and labeled terminal blocks. Contractor shall install stranded wires to all remote devices.
- D. Provide cycle cranking system as recommended by engine manufacturer and cranking limiter with 75 second cranking cycle with lockout.
- E. Provide solid-state voltage regulator as described previously.
- F. Generator set monitoring system shall include solid-state engine monitor with individual lights with lamp test switch and one common external alarm contact to indicate each of the following conditions for each unit:
 - 1. Green Light
 - a. Engine Run/Supplying Load
 - 2. Yellow Light
 - a. High Coolant (Engine) Temperature (Pre-Alarm)
 - b. Low Oil Pressure (Pre-Alarm)
 - c. Low Fuel (Pre-Alarm)/Low Gas Pressure
 - d. Low Battery Voltage
 - e. High Battery Voltage
 - f. Low Coolant Level
 - g. Control Switch not in Automatic Position
 - h. Low Cranking Voltage
 - i. High Fuel Level Alarm (Visual & Audible)
 - 3. Red Light
 - a. Overcrank Shutdown
 - b. Overspeed Shutdown
 - c. High Coolant (Engine) Temperature Shutdown
 - d. Low Oil Pressure Shutdown
 - e. Low Coolant Temperature
 - f. Low Fuel
 - g. Battery Charger AC Failure
 - 4. Flashing Red Light

- a. Switch Off
 - b. Open/Tripped Circuit Breaker
- G. Provide one set of "form C" N.O./N.C. contacts to signal operation whenever the genset is running, and 1 set to open ventilation dampers.
- H. Provide lubricating oil temperature gauge.
- I. Provide low coolant level alarm and shutdown, which shall activate high engine temperature shutdown lamp and alarm.
- J. Provide wiring for normally open auxiliary dry contacts from each circuit breaker located between the generator and automatic transfer switch (including generator mounted circuit breakers).

2.10 AUXILIARY EQUIPMENT AND ACCESSORIES:

- A. Starting Batteries: A heavy-duty, diesel starting, lead-acid battery set shall be provided for each engine and shall be mounted on a battery rack furnished with the generator set. Provide all intercell and connecting battery cables.
- B. Battery Chargers:
 - 1. Provide an SCR voltage regulated battery charger for each genset in the system. Battery charger shall be rated 10 amps minimum.
 - 2. Battery charger shall include the following features:
 - a. DC Voltmeter and Ammeter, 2% accuracy
 - b. On/Off Switch
 - c. 12 Hour Equalize Timer Control Switch
 - d. Alarm Indication Lamps and Dry Contacts to indicate the following conditions: Loss of AC Power, Low Battery Voltage, High Battery Voltage, and Power On.
 - e. Fuse protection of both the power transformer and bridge rectifier.
 - 3. Charger design shall allow charging current to taper to zero amperage when batteries are fully charged.
- C. Provide spring vibration isolators. Number and size as required by total system. Springs shall be near mid-point in field after complete installation.
- D. Each generator shall have a concrete isolation pad with raised portion under skids per the detail on the drawings. Exact size, depth, and steel arrangements shall be verified with the structural engineer after the generator shop drawings are approved.

- E. Main Unit Circuit breaker(s) at the generator. Sized per the drawings. Provide with normally open auxiliary dry contacts to indicate open or tripped condition. Connect to generator monitoring system and remote generator annunciator. Provide with ground fault indication on systems with greater than 150V to ground and 1000A or larger. Provide instructions on the course of action to be taken in the event of a ground fault at the breaker. The ground fault condition shall annunciate at the generator control panel and the remote annunciator(s).
- F. Emergency Shutdown Switch:
 - 1. Exterior Generator Installation: Switch is to be installed on the outside of the building, within sight of but not within 25 feet of the generator. It shall be of the break-glass type, surface mounted, NEMA-3R rated. The operator shall be a maintained push-on/push-off button located behind the glass. Switch shall be provided with lettering to read "Emergency Generator Stop". Activation of switch shall alarm the remote annunciator and generator control panel. Switch shall be Pilla Electrical Products #ST120SN3RBP2SL or equal approved by Engineer.
- G. NFPA 110, Level 2 and optional Standby Systems:
 - 1. Provide all-weather, lockable enclosure to protect the generator system.
 - 2. Exhaust silencer shall be mounted on top of the enclosure. Verify generator orientation and exhaust direction in the field to not discharge exhaust in a direction that it will be brought into the building by HVAC air intakes. Make all required modifications to the exhaust in the field.
- G. Remote annunciator panel with a minimum of 16 indicators and an alarm silence switch. Include all available controller indicators plus line power, generator power and alarm switch off. Provide and install control cable in conduit to interconnect the annunciator panel to the generator. Provide quantity per plans. Annunciator shall also indicate ground fault condition at main circuit breaker(s) at the generator.
- H. Trailer:
 - 1. The trailer shall be provided with slipper type leaf spring tandem suspension equal to 110 percent of the full loaded units (with fuel) weight. It shall have underslung axles complete with four 12" x 2" 12-volt D.C. electric brake shoes.
 - 2. The hubs to be cast spoke and utilize low profile 8" x 14.5" x 12 ply industrial tires rated to 45 to 50 MPH.
 - 3. The main frame of the trailer shall contain 6" formed structural members.
 - 4. A 50U.S. gallon diesel fuel tank of welded construction shall be an integral part of the trailer assembly. The tank shall be 7 gauge, baffled, and the engine suction lines shall be separated between baffles to prevent aeration. The fuel lines to the generating set shall be heavy duty braided oil-resistant hose with swivel connectors that attach to the engine.
 - 5. A 6-way standard 35-amp trailer receptacle shall be connected in accordance with United States Interstate Commerce Commission recommendations to the electric brakes, licenses, stop-turn, tail and running lights which shall be provided. A plug shall be included for user to connect incoming power line from towing truck.

6. The following shall be included: fenders, safety chains, a 1 2/1" I.D. x 5" O.D. swivel mounted lunette towing eye on an adjustable hitch (21"-27") and 1/4" heavy duty 5000-pound adjustable jack stand with sand shoe.

2.11 SEISMIC REQUIREMENTS:

- A. The electric generating system shall meet the seismic design requirements of Section "SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT".
- B. Certification from the manufacturer that a representative engine generator has been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Emergency electric generating system, along with transfer switches, annunciators, generator sets, and all components shall be installed, including all connections, at locations and as indicated on drawings, and wiring diagrams as specified herein, and in accordance with approved shop drawings, manufacturer's instructions, and manufacturer's standard specification and dimension sheets.

3.2 TESTING:

- A. The intent of this specification is to provide equipment of proven reliability and compatibility.
- B. Factory Production Model Tests:
 1. Before shipment of the equipment to the jobsite, the generator set, and other system components shall be tested together under rated load and power factor for proper functioning at the generator set manufacturer's facility, including control and interfacing circuits per the requirements of NFPA 110. No exceptions to the requirements of this paragraph will be accepted.
 2. Other Tests Shall Include:
 - a. Transient response and steady state governing, to demonstrate compliance with this specification.
 3. The Engineer shall be notified in advance of these tests and shall be able to witness these tests. Certified copies of test results shall be forwarded to the Engineer for review, and approval before shipment of equipment to jobsite.

C. Field Tests After Installation:

1. The complete installation shall be initially started and checked out for operational compliance by factory trained representative(s) of the manufacturer of the generator sets, paralleling equipment, and the automatic transfer switches. The engine lubrication oil and antifreeze, as recommended by the manufacturer for operation under environmental conditions specified, shall be provided by the supplier of the generator sets.
2. Upon completion of initial start-up and system checkout, the supplier of the generator sets shall perform a field test, with the Engineer notified in advance, to demonstrate load carrying capability, stability, voltage and frequency response.
3. Simulated power failure test - generator sets shall be made ready for automatic operation and started by means of the test transfer switch(es) on the automatic transfer switch(es). Units shall run for the duration of all time delays and then automatically shut down.
4. The system shall be operated for six hours continuously at the maximum rated load level; except that load shall not exceed 50 percent of generator set rating for first 1/2 hour, during first initial run for proper engine break-in. Records shall be maintained throughout this period to record water temperature, oil pressure, ambient air temperature, voltage, current, frequency and kilowatts. The above data shall be recorded at 15-minute intervals throughout the test. There shall be a 10-minute unloaded run at the conclusion of the test to allow engine to cool before shutdown. Three copies of the field test data shall be furnished to the Engineer. The contractor shall provide necessary cable and make all necessary hook-ups to accomplish field tests and shall furnish all fuel necessary for field test and refill all tanks after testing with winterized fuel.
5. The emergency system is to be tested at 100 percent of its nameplate kW rating at the jobsite.

3.3 LABELING AND PAINTING:

- A. Label the disconnect switch feeding the emergency system. "Emergency Power Disconnect Emergency Generator is Connected to this Feeder".

3.4 CAUTION SIGN:

- A. Electrical contractor shall provide and install an 8" x 11" white enamel finish on 20 gage steel panel (minimum size) secured to the housing of the generator with 3/4" high stenciled red letters: "CAUTION". This Plant Starts Automatically. It May Start At Any Time. "Letters shall be neat and legible. Panel shall be visible to anyone approaching the generator plant.
- B. Install nameplate on 'ATS' and labeled as follows: "This building is provided with a standby emergency generator located adjacent to main service transformer. "Nameplate shall be the same size and type as required for switchboards except that front and back shall be red with white core.

3.5 OWNER ORIENTATION:

- A. A representative of the supplier shall meet with a representative of the Owner at the time of final acceptance tests and shall review the operation and parts books, correct starting and control methods, and recommend preventive maintenance procedures.

END OF SECTION

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SECTION 26 36 00
TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the contract, including general and supplemental conditions, apply to this section.

1.2 DESCRIPTION:

- A. This section includes the furnishing, installation, and connection of automatic transfer switches.

1.3 SUBMITTALS:

- A. Product Data: For each type of automatic transfer switch include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material list for each switch specified.
- C. Operation and Maintenance Data: Include operation and maintenance data for all automatic transfer switches and components in the operation and maintenance manuals. Data shall include but not be limited to:
 - 1. Features and operating sequences.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE:

- A. Source Limitation: Obtain automatic transfer switches, components, and accessories from a single manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR AUTOMATIC TRANSFER SWITCHES:

- A. Automatic transfer switches shall be in accordance with UL, NEMA, NEC, ANSI, NFPA, as specified and as shown on the drawings.
- B. Automatic transfer switches are to be electrically operated, mechanically held, open contact type, without integral overcurrent protection. Transfer switches utilizing automatic or non-automatic molded case circuit breakers as switching mechanisms are not acceptable.
- C. Automatic transfer switches shall be UL listed under UL 1008 and, where applicable, also meet the additional withstand test requirements as specified.

- D. The unit shall be completely assembled and factory wired so that only external circuit connections are required in the field. The unit shall include, but not be limited to, operating mechanism, main contact, auxiliary contacts, timers, pilot lights, switches, and auxiliary sensing devices.

2.2 APPROVED MANUFACTURERS:

- A. Russell Electric, ASCO, Zenith, Onan, Cummins, Kohler and Caterpillar. If ASCO transfer switches are provided, contractor shall provide electrical room layout showing adequate space for all equipment due to the larger size of ASCO transfer switches.

2.3 RATINGS, MARKINGS AND TESTS:

A. Ratings:

1. Phase, voltage and ampere rating shall be as shown on the drawings. Switches shall be break before make switched neutral 4 pole for 3 phase 4 wire systems. The ampere rating shall be for 100 percent continuous load current.
2. Transfer switches are to be rated for total system transfer on emergency systems.
3. Ratings shall be with non-welding of contacts during the performance of the withstand and closing tests.

B. Markings:

1. Markings shall be in accordance with UL 1008.
2. Markings for the additional withstand test hereinafter specified are waived when the testing laboratory is other than UL.

C. Tests:

1. Transfer switches shall be tested in accordance with UL 1008. The contacts of the transfer switch shall not weld during the performance of the withstand and closing tests.

2.4 HOUSING:

- A. Enclose transfer switches in steel cabinets in accordance with UL 508, or in a switchboard assembly in accordance with UL 891, as shown on the drawings. Enclosures shall be NEMA 1 for interior applications and NEMA 3R with cabinet heater and thermostat for exterior applications.
- B. Doors: Shall have three-point latching mechanism where required.
- C. Padlocking Provisions: Provide chain for attaching a padlock. Attach chain to the cabinet by welding or riveting.
- D. Finish: Cabinets shall be given a phosphate treatment, painted with rust inhibiting primer, and finish painted with the manufacturer's standard enamel or lacquer finish.

2.5 FEATURES: TRANSFER SWITCHES SHALL INCLUDE THE FOLLOWING:**A. Operating Mechanism:**

1. Activated by an electrical operator.
2. Electrically and mechanically interlocked so that the main contact cannot be closed simultaneously in both normal and emergency position.
3. Normal and emergency main contacts shall be mechanically locked in position by the operating linkage upon completion of transfer. Release of the locking mechanism shall be possible only by normal operating action.
4. Contact transfer time shall not exceed six cycles.
5. Do not use as a current carrying part. Components and mechanical interlocks shall be insulated or grounded.

B. Contacts:

1. On switch sizes 400 amperes and larger, protect main contacts by separate arcing contacts and magnetic blowouts for each pole. Arc quenching provisions equivalent to magnetic blowouts will be considered for approval.
2. Current carrying capacity of arcing contacts shall not be used in the determination of the transfer switch rating, and shall be separate from the main contacts.
3. Main and arcing contacts shall be visible for inspection with cabinet door open and barrier covers removed.

C. Manual Operator:

1. Capable of operation in either direction under no load.
2. Capable of operation by one person.
3. Provide a warning sign to caution against operation when energized.

D. Replaceable Parts:

1. Include the main and arcing contact individually or as units, relays, and control devices.
2. Switch contacts and accessories are to be replaceable from the front without removing the switch from the cabinet and without removing main conductors.

E. Sensing Relays:

1. Provide voltage sensing relays in each phase of the normal power supply.
2. Provide a voltage frequency sensing relay in one phase of the auxiliary power supply.

2.6 ACCESSORIES: TRANSFER SWITCHES SHALL INCLUDE THE FOLLOWING:**A. Indicating Lights:**

1. Provide a signal light for normal source position.
2. Provide a signal light for emergency source position.
3. Lights shall be different colors.

4. Provide laminated phenolic plastic, white front and back with black core, nameplates to indicate transfer switch position.
- B. Manual Test Switch: Shall simulate normal source failure.
- C. Engine starting contacts.
- D. Time Delay Relays:
 1. Provide time-delay relays to accomplish the function as specified below and on drawings.
- E. Auxiliary Contacts:
 1. Provide contacts for connection to controls, one closed when transfer switch is connected to normal, and one closed when transfer switch is connected to emergency.
 2. Provide additional contacts as necessary to accomplish the functions shown on the drawings, specified, and designated in other sections of these specifications.
 3. Contacts shall have a minimum rating of ten amperes and be positive acting on pickup and dropout.
- F. In phase monitor or center neutral position with time delay in neutral when switch controls motor larger than 10 HP.
- G. Automatic Exerciser:
 1. Clock exerciser for use with load.
 2. Exerciser for use without load.
- H. Heater: For exterior applications, provide electric heater with thermostat to maintain minimum temperature at any point within enclosure at 40 degrees F. Heater shall be sized based on ASHRAE 99.5% minimum temperatures for the project location. Heater shall be 240V. rated and operated at 120V. Manufacturer shall derate heater as required based on 120V. operating voltage.

2.7 TRANSFER SWITCH OPERATION:

- A. A voltage decrease in one or more phases of the normal power source to less than 70 percent of normal shall initiate the transfer sequence. The transfer switch shall start the engine-generator unit after a time-delay of two or three seconds to permit override of momentary dips in the normal power source. The time-delay shall be field adjustable from 0.5 to 6 seconds and factory set at 1 second.
- B. The transfer switch shall transfer the load from normal to emergency source when the frequency and voltage of the engine-generator unit have attained 90 percent of rated value.
- C. Unload running time delay for emergency generator cool down. The time delay shall be field adjustable from 0 to 5 minutes and factory set at 5 minutes.

- D. Retransfer to Normal (All Loads): Transfer switch shall retransfer to normal source upon restoration of normal supply in all phases to 90 percent or more of normal voltage, and after a time-delay. Time-delays shall be field adjustable from five to twenty-five minutes (preset for twenty-five minutes). Should the emergency source fail during the timing, the transfer switch shall immediately transfer to normal when the source is available.
- E. Transfer to Emergency (Emergency System Loads): Transfer switches for emergency system loads shall transfer their loads from normal to emergency source when frequency and voltage of the engine-generator unit have attained 90 percent of rated value. Only those switches with deficient normal source voltage shall transfer.
- F. Transfer to Emergency (Equipment System or Optional Stand-By System Loads): Transfer switches for equipment system loads shall transfer their loads to the generator on a time-delayed staggered basis, after the emergency system switches have transferred. Total delayed transfer time of an equipment system switches shall not exceed two minutes. Time-delay relays shall be field adjustable from zero to two minutes.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with the NEC and as shown on the drawings.
- B. Floor Mounting Switch: Anchor to floor by bolting.
 - 1. Concrete Bases: 3.5" high with chambered edges. Extend base no more than 4" in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support.

3.2 SPARE PARTS: FURNISH THE FOLLOWING:

- A. Six spare control fuses of each rating.
- B. Six spare pilot lamps of each type used.

3.3 TESTING:

- A. When the complete system has been installed, and prior to the final inspection, test all components of the system in the presence of the engineer for proper operation of the individual components and the complete system and to eliminate electrical and mechanical defects.
- B. When any defects are detected, correct the defects and repeat the test as requested by the engineer, at no additional cost to the Owner.

3.4 INSTRUCTIONS AND FINAL INSPECTIONS:

- A. At the final inspection in the presence of the engineer, demonstrate that the complete auxiliary electrical power system operates properly in every respect.

- B. Furnish the services of a competent, factory-trained engineer or technician for one four hour period, for instructing personnel in adjustment, operation, and maintenance of the equipment, on a date requested by the engineer.

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SECTION 26 43 13

SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

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 field-mounted and factory-mounted surge protective devices for low-voltage (120 to 600 V) power distribution and control equipment.
- B. Related Sections:
 - 1. Division 26 Section "Wiring Devices" for devices with integral TVSS.

1.3 DEFINITIONS:

- A. ATS: Acceptance Testing Specifications.
- B. SPD: Surge Protective Device.
- C. TVSS: Transient voltage surge suppressor(s), both singular and plural; also, transient voltage surge suppression.
- D. VPR: Voltage Protection Rating.

1.4 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include rated capacities; installed dimensions and operating weights; electrical characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include wiring diagrams for power, signal, and control wiring.
- C. Operation and Maintenance Data: Include operation and maintenance data for all surge protective devices in the operation and maintenance manuals.

1.5 QUALITY ASSURANCE:

- A. Source Limitations: Obtain surge protective devices, components, and accessories, within same product category, through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for the intended locations and application.
- C. The unit shall be UL 1449 Listed (internally mounted units shall be UL recognized) as a Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference Filter.

Internally mounted units shall maintain the UL Listing of the equipment they are mounted in.

- D. Comply with NFPA 70.
- E. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.

1.6 COORDINATION:

- A. Coordinate layout and installation of surge protective devices and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate surge protective devices with Division 26 Section "Electrical Power Monitoring and Control."

1.7 PROJECT CONDITIONS:

- A. Service Conditions: Rate surge protective devices for continuous operation under the following conditions unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage for 480/277Y and not less than 125 percent of nominal system operating voltage for 208/120Y.
 - 2. Operating Temperature: 30 to 150 deg F (0 to 65 deg C).
 - 3. Humidity: 0 to 95 percent, non-condensing.
 - 4. Altitude: Less than 12,000 feet above sea level.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner in writing, not fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of electric service without Owner's written permission.
 - 3. Comply with NFPA 70E.

1.8 EXTRA MATERIALS:

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Replaceable Protection Modules: 1 of each size and type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following list of manufacturers:
 - 1. Current Technologies
 - 2. Cutler Hammer
 - 3. General Electric Company
 - 4. Liebert Corp.
 - 5. Siemens Infrastructure and Cities (Siemens IC)
 - 6. Square D by Schneider Electric
 - 7. Transtector
 - 8. Leviton (For Retrofit and Add-On Devices Only)
 - 9. Innovative Technology Inc. (For Retrofit and Add-On Devices Only)

2.2 GENERAL REQUIREMENTS:

- A. UL 1449 Listed.
- B. Internally mounted within the electrical equipment unless noted otherwise.
- C. Modular design with field-replaceable modules, minimum of 1 module per phase.
- D. MOV's shall be individually fused per mode, with a 200-kA minimum interrupting capacity and shall be classified by the NEC as an overcurrent protection device allowing tapped device conductors from a disconnect without an overcurrent device.
- E. UL 1449 minimum nominal discharge current rating of 20kA per mode.
- F. Bolted compression lugs for internal wiring.
- G. Integral disconnecting means if direct bussed connected.
- H. Redundant suppression circuits.
- I. LED indicator lights for power and protection status.
- J. On board diagnostic monitoring with audible alarm, and silencing switch, to indicate when protection has failed and when failure of even one MOV has occurred.
- K. Surge-event operations counter.
- L. EMI/RFI filtering of -50dB @ 100kHz.

M. Protection Modes and UL 1449 Maximum Voltage Protection Ratings shall be as follows:

Voltage	Line-to-Neutral	High Leg-to-Neutral	Line-to-Ground	High Leg-to-Ground	Line-to-Line	High Leg-to-Line	Neutral-to-Ground
120/240, 3 Phase, 4 Wire with High Leg	700V	1200V	1200V	1000V	1200V	1500V	700V

2.3 SERVICE ENTRANCE SURGE PROTECTIVE DEVICES:

- A. Devices shall be factory installed and built-in with direct bussed connections.
- B. Include integral 60A disconnect switch.
- C. Peak Single-Impulse Surge Current Rating: 150 kA per phase.

2.4 PANELBOARD SURGE PROTECTIVE DEVICES:

- A. Devices shall be factory installed with direct bussed connections where possible.
- B. If the manufacturer requires a disconnect, an integral disconnect switch or molded case breaker (60 amp min.) shall be provided. Submit testing to demonstrate that overcurrent devices do not open upon peak single impulse surge current test.
- C. Arrangement with bussed or wire connections to phase buses, neutral bus, and ground bus. Ground and neutral buses should be relocated to minimize connection lengths. If cables are used, they shall be the lowest impedance possible. Wires shall be kept as short and straight as possible. Do not exceed manufacturer's recommended lead lengths.
- D. Modifications to the panelboard shall be UL labeled as a panelboard and as a SPD. For two and three section panelboards, the SPD module shall be installed in the first section where the line connections occur.
- E. Peak Single-Impulse Surge Current Rating: 150 kA per phase.

2.5 CONTROL PANELS AND MISCELLANEOUS 120V. EQUIPMENT:

- A. Peak Single-Impulse Surge Current Rating: // 80 kA per phase. // 40 kA per phase. //

2.6 ENCLOSURES:

- A. Internally mounted unless otherwise specified. Add-on devices shall comply with NEMA 250, matching the enclosure or panel being protected.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTIVE DEVICES:

- A. Install devices at service entrance on load side of main disconnect, with ground lead bonded to service entrance ground.

- B. SPD equipment and devices. Upon completion the Representative shall submit a letter certifying the complete installation is per this specification and per all manufacturer's requirements and recommendations.
- C. Retrofit and Add-On Surge Protective Devices:
 - 1. Disconnect switch or molded case circuit breaker shall be located in the first section of the panelboard to be protected.
 - 2. Cables shall have the lowest impedance possible. Locate the switch nearest to the main breaker or M.L.O. Locate the suppressor beside the switch with a close nipple connection. Connect to switch with high strand count #2 Cu. welding cables 6" preferred, (18" maximum length).
 - 3. Do not exceed manufacturer's recommended lead lengths.

3.2 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 and UL 486B.

3.3 FIELD QUALITY CONTROL:

- A. Testing: Perform the following field quality-control testing:
 - 1. After installing surge protective devices, but before electrical circuitry has been energized, test for compliance with manufacturer's published field testing requirements.
 - 2. Complete startup checks according to manufacturer's written instructions.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.19. Certify compliance with test parameters.
- B. Manufacturer shall repair or replace malfunctioning units. Retest after repairs or replacements are made.
- C. Verify that electrical wiring installation complies with this specification and manufacturer's installation requirements.
- D. Do not perform insulation resistance (megger) tests of the distribution wiring equipment with the surge protective devices installed. Disconnect all wires, including neutral, before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.4 START-UP SERVICE:

- A. The manufacturer shall train the Owner's maintenance personnel to adjust, operate, and maintain surge protective devices (minimum one (1) hr of field training).
 - 1. Train Owner's maintenance personnel on procedures and schedules for maintaining suppressors.
 - 2. Review data in maintenance manuals.
 - 3. Contractor shall schedule training with Owner, through Architect, with at least seven days advance notice.

END OF SECTION 264313

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SECTION 26 51 00
BUILDING LIGHTING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. This section includes the furnishings, installation of and connection of all building lighting.

1.2 DEFINITIONS:

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES:

- A. Shall conform to the detail drawings, NEC Article 410 and UL-57.
- B. Approved Manufacturers: Provide products of firms regularly engaged in the manufacture of lighting fixtures of types and rating required, whose products have been in satisfactory use in similar service for not less than 5 years. The manufacturer of the lighting fixtures shall comply with the provisions of the appropriate code and standards. All fixtures shall be pretested before shipping.
- C. UL or CSA US Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the "Standards for Safety" to UL 8750 or others as they may be applicable. A listing shall be provided for each fixture type, and the appropriate label or labels shall be affixed to each fixture in the position concealing it from normal view.
- D. Specifications and scale drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work.
- E. Sheet Metal:
1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved), and parallel to each other as designed.

2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 3. Where lighting fixture types are detailed with minimum 20 gauge (0.035 inch) housing, minimum 22 gauge (0.029 inch) housings will be acceptable provided they have strengthening embossed rib and break formations, and meet the rigidity test requirements of Fed. Spec. W-F-1662.
 4. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
 5. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.
- F. LED Drivers shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.
- G. Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.
- H. Light fixtures with louvers or light transmitting panels shall have doors with hinges, latches and safety catches to facilitate safe, convenient cleaning and relamping. Vaportight fixtures shall have pressure clamping devices in lieu of the latches.
- I. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- J. Metal Finishes:
1. The manufacturer shall apply a standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
 2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise shown on the drawing.
 3. Exterior finishes shall be as shown on the drawings.
- K. LED Drivers:
1. Driver shall be serviceable while the fixture is in its normally installed position, and shall not be attached to removable reflectors or wireway covers unless so specified.

2. Disconnecting Means: Each LED fixture installed in an indoor location shall have a disconnecting means either internal or external to the fixture, to disconnect simultaneously from the source of supply all conductors of the driver, including the grounded (neutral) conductor if any. The line side terminals of the disconnecting means shall be guarded. The disconnecting means shall be located so as to be accessible to qualified persons before servicing or maintaining the driver. The disconnecting means is required for new light fixtures, when an existing driver is replaced, when an existing light fixture is relocated, and when an existing light fixture is recircuited. The disconnecting means shall not be required for fixtures installed in hazardous (classified) locations or for cord-and-plug-connected fixtures.
3. All drivers shall be labeled or listed by UL or ETL. Case marking shall also indicate the required supply voltage, frequency, RMS current, current surge during starting, input watts, and power factor at the designed voltage, open circuit voltage, crest factor and efficacy.
4. Submit, simultaneously with shop drawings, a certified test report by an independent testing laboratory showing that the badrivers meet or exceed all the performance requirements in this specification.
5. LED Drivers:
 - a. General Requirements: Unless otherwise indicated, features include the following:
 - 1) Voltage Range: +/- 10 percent of rated input.
 - 2) Total Harmonic Distortion Rating: ≤ 20 percent.
 - 3) Power Factor: ≥ 95 Percent.
 - 4) UL Class 2 output.
 - 5) Line Frequency: 60 Hz.
 - 6) Inrush Current: Per NEMA 410.
 - 7) Ambient Temperature Range: 0°C to 25°C.
 - 8) Maximum Case Temperature: 90°C.
 - 9) Sound Rating: Class A or better.
 - 10) Integral Short Circuit, Open Circuit, and Overload Protection: IEEE C82.41.2
 - 11) Electromagnetic Compliance: FCC Title 47, Part 15, Class A.
- L. Provide all lighting fixtures with a specific means for grounding their metallic wireways and housings to an equipment grounding conductor.
- M. Lighting Transmitting Components for Fluorescent/LED Fixtures:
 1. Shall be 100 percent virgin acrylic plastic and nominal .125 inch thick. Styrene lenses shall not be provided for any fixture.
 2. Unless otherwise specified lenses and diffusers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking. At final inspection, all lens that sag or do not lay down flat and lens that sag shall be replaced by the manufacturer.

2.2 LED MODULES:

A. LED Modules:

1. LED modules shall include the following features unless otherwise indicated:
 - a. Comply with IES LM-79, LM-80, LM-82 and TM-21 requirements.
 - b. Minimum CRI 80 and color temperature [3500] K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
 - c. Minimum Rated Life: IES L70 = [50,000] hours.
 - d. Light output lumens as indicated in the LIGHTING FIXTURE SCHEDULE.
 - e. LED chips shall be wired so that failure of one chip does not prohibit operation of the remainder of the chip array.
2. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
3. Color shift over 6,000 hours shall be <0.007 change in U'V' as demonstrates in the IES LM-80-08 testing report.

2.3 LIGHTING CONTROL EQUIPMENT:

- A. See the drawings for the arrangement and method of control. Controls shall operate at 120 volt. Connect to the nearest 120 volt panel or as shown on the drawings.
- B. Contactors And Relays:
 1. Shall be as manufactured by Cutler-Hammer, Allen Bradley, G.E., Westinghouse or Square D by Schneider Electric. They shall be as sized on the drawings.
 2. All contactors and relays shall be Tungsten rated.
- C. Photo Electric Controls:
 1. Photo Electric Controls by Tork, Intermatic and Paragon equal to those indicated below and approved by the Engineer will be acceptable.
 2. Photo Electric Controls (Photo switches; Photo cells) shall be Intermatic #K4133 rated at 3000W, 277 volts, or #K4121 rated at 1800W, 120 volts, weatherproof. Mount on roof and orient photo electric controls to the north. Photo-electric controls supplied as a part of a fixture assembly shall be as provided by fixture manufacturer.
- D. When a photo cell and time clock are specified for combination control, they shall be connected in series. The time clock to be on during the day, the photo cell will turn the lights on during the day if a storm passes over and at dusk. Set the time clock to turn the lights off in the evening and back on before sunrise per the owners requirements. At sunrise, the photo cell will turn the light off.

2.4 EMERGENCY LIGHTING AND POWER:

- A. When emergency battery power packs are optional to the specified exit signs and emergency fixtures and are not included in the model number in the light fixture schedule, the emergency battery power packs shall be included as part of the specified fixture when they are not connected to an emergency generator system. Verify on drawings.
- B. Exit Signs and Other Emergency Fixtures:
 - 1. Provide emergency battery power packs on all exit signs and emergency fixtures that are not connected to an emergency generator.
 - 2. Batteries shall be lead calcium, pure lead, or nickel cadmium. Lead acid will not be accepted. Batteries shall be unconditionally guaranteed for 5 years with a 10 year prorated warranty from the factory. Units shall be Underwriter's Laboratory listed and labeled as an emergency unit. Batteries shall be provided as standard or as optional equipment of the same series of the specified fixtures.
 - 3. The emergency Battery Section shall be connected on the same circuit as the light ahead of any switches or contactors controlling area lights so that emergency lighting is maintained at all times.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with the NEC, and as shown on the drawings.
- B. Align, mount and level the lighting fixtures uniformly.
- C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Engineer.
- D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings. Verify all heights with the Architect prior to mounting.
- E. Lighting Fixture Supports:
 - 1. Provide adequate support for light fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members above a suspended ceiling or to structural members within a partition (for wall mounting).
 - 2. Maintain the fixture positions after cleaning and relamping.
 - 3. Support the lighting fixtures without causing the ceiling or partition to deflect.
 - 4. Hardware for recessed fluorescent/LED fixtures:
 - a. For suspended ceiling systems and plaster frame construction, hardware devices such as bolts, screws or rivets shall be used to secure the fixture to the ceiling system structural members. Listed clips identified for use with the type of ceiling framing member(s) and light fixture(s) shall also be permitted.

- b. Fixtures shall be secured to the ceiling system at not less than each of the four corners with additional support and/or connection as required to resist spreading of the support members and to safely lock the fixture into the ceiling system.
- 5. Hardware for surface mounting LED fixtures to suspended ceilings:
 - a. In addition to being secured to any required outlet box, fixtures shall be bolted to a grid ceiling system at four points spaced near the corners of each fixture. The bolts shall be not less than 1/4-inch secured to channel members attached to and spanning the tops of the ceiling structural grid members. Nonturning studs may be attached to the ceiling structural grid members or spanning channels by special clips designed for the purpose, provided they lock into place and require simple tools for removal.
 - b. In addition to being secured to any required outlet box, fixtures shall be bolted to a plaster ceiling at four points spaced near the corners of each fixture. Prepositioned 1/4-inch studs or threaded plaster inserts secured to ceiling structural members shall be used to bolt the fixtures to the ceiling. In lieu of the above, 1/4-inch toggle bolts may be used on new or existing ceiling provided the plaster and lath can safely support the fixtures without sagging or cracking.
- 6. Provide safety supports from fixture housing up to structure above for all fixtures weighing more than 15 lbs. Supports shall be chains, aircraft cable, factory or field fabricated and rated in excess of twice the weight of the fixture.
- F. Provide and install new lamps for each new lighting fixture installed and for each existing lighting fixture reinstalled.
- G. Contractor shall coordinate between the electrical and ceiling trades to ascertain approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed. Lay-in type fixture installed in sheet rock ceilings shall be provided with a flange and bolted to the ceiling.
- H. Connection to all fixtures mounted in lay-in ceilings shall be as follows: Provide J-Box supported from structure at 12-inches above fixtures for connections. Install UL listed 3/8-inch or 1/2-inch flexible conduit whip down to each fixture. Each whip shall be field cut to length to allow fixture to be relocated 4-foot-0-inches in any direction. Whips shall include 2 or 3 #12 Cu. THHN/THWN conductors (numbers as indicated) and a #12 ground. Fixtures supplied with UL listed whip shall be supplied with ground conductors. Tandem fluorescent fixtures shall have a factory supplied UL listed whip with conductors as required to interconnect fixtures. Length shall allow mounting fixtures 12-foot-0-inches on center in any direction.

END OF SECTION 265100

SECTION 31 23 24
FILL AND BACKFILL

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. Filling, backfilling, and compacting for building below grade, footings, slabs- on-grade and site structures.
2. Building Area Subgrade Pad preparation.

B. Related Documents:

1. Geotechnical Report: Geotechnical Engineer observations and recommendations.

C. Related Sections:

1. Section 01 45 33- Testing Laboratory Services: Testing requirements.
2. Section 31 23 33 - Trenching for Site Utilities: Trenching for utilities outside the building.
3. Section 32 13 13 - Portland Cement Concrete Pavement: Concrete pavement and base.

1.3 REFERENCES

(Current Edition at Date of Bid)

A. American Society for Testing and Materials (ASTM):

1. ASTM C 33 - Standard Specification for Concrete Aggregates.
2. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
4. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Assurance/Control Submittals:

1. Test and Inspection Reports: Submit the following test and inspection reports in conformance with Section 01 45 33.

- a. Compaction density testing and evaluations.
2. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

- A. Backfill Placement Qualifications: Company specializing in the Work of this Section with minimum 5 years documented experience.

1.6 PROJECT CONDITIONS

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 2. Prevent contamination.
 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. General Fill: Subsoil excavated on-site.
 1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 2. Conforming to ASTM D 2487, Group Symbol GW, GM, GC, SW, SP, SM, CL and ML.
- B. Structural Fill: Inspected and approved by Independent Testing Laboratory.
 1. Low volume change cohesive soil with liquid limit less than 35, a plasticity index between 9 and 13.
 2. Graded, containing at least 15 percent fines (material passing the No. 200 sieve, based on dry weight).
 3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 4. Sandy Clays conforming to ASTM D 2487, Group Symbol SC or Clayey Sands conforming to ASTM D 2487, Group Symbol CL.
 - a. Gravel, free of sharp corners or edges, natural stone; washed, free of clay, shale, organic matter; 1/4 inch minimum size, 5/8 inch maximum size.
- C. Aggregate Fill: Clean crushed concrete aggregate conforming to ASTM C 33.
- D. Limestone Screening Fill: Inspected and approved by Independent Testing Laboratory.
 1. Non-expansive with plasticity index less than 12.

- E. Concrete for Fill: As specified in Section 03 30 00; compressive strength of 3000 psi.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Identify required lines, levels, contours, and datum locations.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Prior to placement of fill in Building Area, Geotechnical Engineer-of-Record to inspect and Independent Testing Agency to evaluate moisture content of exposed soils and make recommendations.
- B. Proof roll exposed subgrade with moderately loaded dump truck.
- C. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill.
- D. Scarify subgrade surface to a depth of 6 inches to identify soft spots.
- E. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- F. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

- A. Fill up to subgrade elevations unless otherwise indicated.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. General Fill: Place and compact material in equal continuous layers not exceeding 9 inches of loose material.

- F. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- G. Correct areas that are over-excavated.
 - 1. Load-Bearing Foundation Surfaces: Use structural fill, flush to required elevation and compaction.
 - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density and moisture 2 percent above optimum moisture content.
- H. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under concrete paving, site concrete slabs-on-grade, and similar construction: 95 percent of maximum dry density and moisture content 3 percent above optimum moisture content.
 - 2. Compact using a vibratory sheeps foot having a minimum drum size of 60 inches.
- I. Compaction Density for Utility Trenches within Building Area Subgrade Pad Area:
 - 1. 95 percent of maximum dry density and moisture content 3 percent above optimum moisture content.
 - 2. Compact using a vibratory sheeps foot having a minimum drum size of 60 inches.

3.4 FIELD QUALITY CONTROL

- A. Section 01 45 33 - Quality Co Requirements: Contractor Quality Control Representative shall perform contractor quality control inspections.
 - 1. Inspect fill placement operations and compaction.
 - 2. Document preparatory, initial and follow-up inspection in Contractor Test and Inspection Reports and submit to Architect.
- B. Perform the following tests and inspections.
 - 1. Inspection and approval of structural fill material.
 - 2. Determine actual groundwater levels at start of earthwork operations.
 - 3. Perform compaction density testing on compacted fill in accordance with ASTM D 2922.
 - 4. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 (Standard Proctor).
 - 5. If tests indicate work does not meet specified requirements, remove work, replace and retest.
 - 6. Frequency of Tests:
 - a. For structural fill areas at Building Area Subgrade Pad: 1 per every lift of fill per 2500 square feet, minimum 2 tests.
 - b. For structural fill areas at Paved Areas: 1 per every lift of fill per 5000 square feet, minimum 2 tests.
- C. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

3.5 CLEAN-UP

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stock pile area to prevent standing surface water.

END OF SECTION

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SECTION 31 23 33
TRENCHING FOR SITE UTILITIES

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. Backfilling and compacting for utilities outside the building to utility main connections.

- B. Related Documents:

- 1. The Contract Documents, as defined in Document 00 72 00 - General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):

- 1. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 DEFINITIONS

- A. Finish Grade Elevations: Indicated on Drawings.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:

- 1. Provide protection for workers within trench areas in accordance with local, state and federal Occupational Safety and Health requirements and regulations.

1.6 PROJECT CONDITIONS

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. Verify that survey bench marks and intended elevations for the Work are as indicated.

- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 - PRODUCTS

2.1 TRACE TAPE

- A. Detectable tape, 3 inch wide with aluminum foil core encased in polyethylene plastic jacket with large letters permanently marked.
- B. Color and markings as required by the American Public Works Association as follows, unless otherwise required by local authority having jurisdiction.
 - 1. Red: Electrical lines; mark "CAUTION ELECTRIC SERVICE."
 - 2. Yellow: Gas lines; mark "CAUTION GAS SERVICE."
 - 3. Blue: Water lines; mark "CAUTION WATER SERVICE."
 - 4. Green: Sewer or storm drain lines; mark "CAUTION SEWER SERVICE."
 - 5. Orange: Telephone, television or communications lines; mark "CAUTION TELEPHONE SERVICE."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Identify required lines, levels, contours, and datum locations.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Stake and flag locations of known utilities before starting any excavating work.
 - 1. Contact Oklahoma One Call System at (800) 522-6543 for utility company location of existing lines on or adjacent to Project site.
 - 2. Protect utility lines from damage.

3.3 TRENCHING

- A. Notify Architect and Owner's Representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches as indicated on Drawings and wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard material which could damage piping or impede consistent backfilling or compaction.
- G. Remove excavated material that is unsuitable for re-use from site.
- H. Stockpile excavated material to be re-used in area designated on site.
- I. Remove excess excavated material from site.

3.4 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.5 BACKFILL

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Gravel: Place and compact materials in equal continuous layers not exceeding 6 inches loose material.
- F. Fill: Place and compact material in equal continuous layers not exceeding 9 inches loose materials.
- G. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

- H. Correct areas that are over-excavated.
 - 1. Thrust bearing surfaces: Fill with concrete.
 - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated: 95 percent of maximum dry density and moisture content between 2 percent below and 2 percent above the optimum moisture content.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Install continuous trace tape 6 inches above top of pipe.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Contractor Quality Control Representative shall perform contractor quality control inspections.
- B. Inspect trenching operations, fill placement, fill type and compaction density.
- C. Document preparatory, initial and follow-up inspection in Contractor Test and Inspection Reports and submit to Architect.
- D. Section 01 45 33 - Testing Laboratory Services: Perform the following tests.
 - 1. Compaction density testing on compacted fill in accordance with ASTM D 2922.
 - 2. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 (Standard Proctor).
 - 3. If tests indicate work does not meet specified requirements, remove work, replace and retest.
 - 4. Frequency of Tests:
 - a. For backfill areas at Paved Areas: 1 for each 2 feet of backfill for each 400 feet, or portion, of trenching.
- E. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

3.7 CLEAN-UP

- A. Leave unused materials in a neat, compact stockpile.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

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SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROL

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. Temporary and permanent erosion control systems.

- B. Related Documents:

- 1. The Contract Documents, as defined in Section 00 72 00 - General Conditions and modifications thereto, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.3 PROJECT CONDITIONS

- A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work. Take all necessary measures to prevent sedimentation from construction operations to enter adjacent property. Offsite discharge of sedimentation is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Gravel.
- B. Straw Bales: Free of weed seed.
- C. Fencing for Siltation Control: UV resistant geotextile fabric.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 EROSION CONTROL AND SLOPE PROTECTION

- A. Provide erosion control and slope protection measures to prevent sediment from site entering adjacent property or public right-of-way to include but not be limited to:
 - 1. Temporary silt fences.
 - 2. Straw bales placed around culvert openings or inlets.
 - 3. Gravel in trenches until concrete is replaced.
- B. Place all erosion and siltation control measures before start of earthwork and grading construction operations.
- C. Mulch and seed all storm and sanitary sewer trenches not in streets no later than 10 days after backfill. Do not permit more than 500 feet of trench to be open at any one time.
- D. Place all excavated material on uphill side of trenches where possible. Do not place materials in stream beds. Seed any stockpiled material which remains in place longer than 30 days with temporary vegetation and mulch.
- E. Mulch and seed all temporary earth berms, diversions, erosion barriers and temporary stockpiles with temporary vegetative cover with 10 days after grading.
- F. Do not stockpile or otherwise place dredged, excavated or other material, at any time, in or near stream bed which may increase turbidity of water. If turbidity producing materials are present, hold surface drainage from cuts and fills within construction area and from borrow and waste disposal areas in suitable sedimentation ponds or grade surface drainage to control erosion within acceptable limits. Provide and maintain temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required, until permanent damage and erosion control facilities are completed and operative. Hold to minimum area of bare soil exposed at any one time by construction operations.
- G. Drain dredged material minimum 7 days. Store material for drainage to maximum 4-foot height.
- H. Owner's Representative may direct Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary erosion control measures.
- I. Maintain temporary erosion control systems as directed by Owner's Representative to control siltation during construction. Provide maintenance or additional Work directed by Owner's Representative immediately upon notification by Owner's Representative.

END OF SECTION

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SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work performed under this section consists of construction of concrete pavements, over the areas as shown on the Drawings in conformance with the dimensions, lines, grades, thicknesses, and typical sections shown on the Drawings or established by the RPR. The term “concrete pavements” shall include street and parking lot paving, curb and gutter, sidewalks, driveways, valley gutters and other similar exposed, slab on grade construction.

1.2 DEFINITIONS

- A. ASTM: ASTM International
- B. RPR: Resident Project Representative

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. As Per Division 03 Concrete.
 - 2. Joint Sealing Material.
 - 3. Expansion Joint Filler.
 - 4. Concrete Curing Materials.
- B. Construction methods:
 - 1. Method of concrete placement.
 - 2. Materials and Equipment for concrete placement.

PART 2 - PRODUCTS

2.1 CONCRETE PAVEMENT

- A. Portland Cement Concrete as per Division 03 Concrete and the information provided on the Drawings. Concrete minimum 28-day compressive strength shall be 4000 psi, unless indicated otherwise on the Drawings.
- B. Steel Reinforcement as Per Division 03 Concrete and the information provided on the Drawings.

C. Hot Joint Sealing Compound.

1. Provide a joint sealant that is a homogeneous blend of elastomers and other plasticizers and agents blended to result in a product that seals cracks in pavements from water intrusion.
2. The sealant must retain adhesion and flexibility during extremes of expansion and contraction of the crack through a temperature range of 0°F to 140°F. Heat and apply the material according to manufacturer's recommendations.
 - a. Bond: When tested at -20°F to 200% extension of 1/2 inch to 1-1/2 inch for 3 cycles, the material exhibits no cracking, separation, or other opening that at any point is greater than 1/4 inch deep in the sealer or between the sealer and the mortar block. A minimum of 2 test specimens in a set of 3 representing a given sample must comply with this requirement.
 - b. Flow: 5 mm maximum.
 - c. Resilience: 50 -80% recovery.
 - d. Penetration: 0° F, 150 grams, 5 seconds: 18 - 80
3. Provide material capable of a minimum 12-hour pot life at application temperature and of being re-heatable at least once (in a normal field application) without experiencing changes in application characteristics, polymer and oil separation, balling or other signs of gelling.
4. Package the material in pails or boxes clearly marked with recommended pouring temperature, maximum heating temperature, shelf life if appropriate, and batch number. The size of a batch, which is any well-defined quantity produced by essentially the same process during a designated amount or time (such as an 8-hour shift), must be a minimum of 10,000 lbs.
5. Lots from the same manufacturer may be commingled during application. Do not comeingle materials from different manufacturers.

D. Cold Applied Chemically Cured Joint Sealant

1. Joint Sealant. Use either Type NS (Non- Self-Leveling) or Type SL (Self-Leveling). Provide joint sealants that consist of a cold applied formulation that is self priming and compatible with Portland Cement concrete. The sealants must comply with the applicable test requirements in ASTM D 5893. Acetic acid cure sealants will not be accepted.

E. Preformed Expansion Joint Filler

1. Provide material that complies with AASHTO M 213.
2. Asphalt Expansion Joints shall be composed of asphalt, vegetable fibers, and mineral fillers, formed under heat and pressure between two asphalt-saturated felt liners. Asphalt Expansion Joints shall conform to AASHTO M33 or ASTM D994, shall be 1/2" thick and weigh approximately 3 pounds per square foot, unless shown otherwise on the Drawings.

F. Liquid Membrane Curing Compound

1. Provide liquid membrane forming compound that complies with AASHTO M 148 for Type 1-D, clear or translucent with fugitive dye, or Type 2, white pigmented compound.

2. Type 2 white pigmented compound will be further classified into Type 2 (Wax Based) and Type 2 (Other). This is to allow specifying of wax based compound for certain applications where a bond breaker is desired. Either formulation base may be supplied except when wax based is specified.
3. Do not allow water-emulsion based material to freeze. Material that has been subjected to freezing temperatures will be rejected.

G. Fly Ash as Per Division 03 Concrete.

PART 3 - EXECUTION

3.1 GENERAL

- A. Concrete pavement shall be constructed to the detailed thicknesses and to the lines and grades shown on the Drawings. Concrete shall be placed over moistened and unfrozen subgrade. The ambient temperature shall be at least 40° F. and rising. If the ambient temperature exceeds 90° F, the RPR has the authority to suspend operations until weather conditions improve. The subgrade shall be free of excessive moisture prior to concrete placement.

3.2 PREPARATION OF THE SUBGRADE

- A. Before placing any surfacing material on any section, complete the ditches and drains along that section to effectively drain the surface to be paved.
- B. Trim the base or subgrade to the line, grade and typical cross-section as shown in the Drawings. Maintain the subgrade or base to the as-constructed condition, repairing any encountered defects to the specifications.
- C. Maintain the subgrade surface to readily drain at all times. Protect the subgrade from damage when handling materials, tools and equipment. Do not store or stockpile materials on the subgrade.
- D. Do not place material or lay pavement on a frozen or muddy subgrade, or when it is raining or snowing.
- E. Lightly spray the subgrade or base with water to obtain a thoroughly moistened condition when the concrete is deposited on it. Do not puddle water on the grade.
- F. Do not deposit any material until the subgrade or base has been checked and approved by the RPR.
- G. Subgrade Preparation shall be of the types and thicknesses as shown on the Drawings.

3.3 PLACING REINFORCEMENT

- A. Place pavement reinforcement at the locations shown in the Drawings. Use a sufficient number of approved metal bar supports or pins to hold all dowel bars and tie bars in proper position as required by the Drawings.
- B. Longitudinal joint tie bars and dowel bars may be installed mechanically if approved by the RPR. The satisfactory placement of the bars depends on the ability of the Contractor's operation to place and maintain the bars in their true position. When satisfactory placement is not obtained by mechanical means, the RPR may require the tie bars and dowel bars be installed ahead of placing the concrete, and that they be securely held in their exact position by staking and tying.
- C. Thoroughly coat each dowel with hard grease or other approved bond breaker as shown in the Contract Documents. The bond breaker coating shall not exceed $15 \text{ mils} \pm 5 \text{ mils}$ in thickness when averaged over 3 points measured at the $\frac{1}{4}$ points on the bar at 90° intervals around the bar.
- D. When reinforced concrete pavement is placed in 2 layers, strike off the entire width of the bottom layer to such length and depth that the sheet of fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. Place the reinforcement directly on the concrete, then place the top layer of concrete, strike it off and screed it. Remove any portion of the bottom layer of concrete that has been placed more than 30 minutes, and replace it with fresh mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of the concrete placement or it may be placed in the plastic concrete after initial spreading, by mechanical or vibratory means.
- E. Place the wire mesh reinforcement in the pavement at the locations shown in the Drawings.
 - 1. When two layers of wire mesh reinforcement are required, support the bottom layer in the required position with bar chairs. Use separators for the top layer if the strike-off cannot be used properly for the operation.
 - 2. Lap the reinforcement as shown in the Drawings. Laps parallel to the centerline of the pavement are prohibited except for unusual width of pavement lanes or for irregular areas.
 - 3. If the Drawings do not show dimensions for laps, the minimum lap either perpendicular or parallel to the centerline of the pavement is 6 inches.
 - 4. Fasten or tie adjacent wire mesh sheets together to hold all parts of the wire mesh sheets in the same plane.
- F. If a "wire pattern" appears on the surface of the fresh pavement, immediately modify placement procedures to eliminate the problem.
- G. Use reinforcing steel free from detrimental materials that could impair the bond between the steel and concrete.

3.4 FIXED FORM PAVING

A. Forms

1. Use straight, metal forms having adequate strength to support the proposed operations. Each section shall be a minimum of 10 feet in length. Use forms with a depth equal to the prescribed edge thickness of the concrete, a base width at least equal to the depth of the forms and without a horizontal joint.
2. Forms to be used as track for subgrade planers and finishing machines shall have a base width at least eight inches wide.
3. Use flexible or curved forms of proper radius for curves of 150-foot radius or less, except approved straight forms of 5-foot lengths may be used for curves of a radius from 75 to 150 foot. Flexible or curved forms must be approved by the RPR.
4. The RPR may approve the use of wood forms in areas requiring hand finishing.
5. Secure the forms in place to withstand the impact and vibration of the consolidating and finishing equipment without visible spring or settlement. Extend flange braces outward on the base a minimum of $\frac{2}{3}$ the height of the form.
6. Remove forms with battered top surfaces or bent, twisted or broken forms. Do not use repaired forms until they have been inspected and approved by the RPR.
7. Do not use buildup forms, except where the total area of pavement of any specified thickness on the project is less than 2,000 square yards.
8. Do not vary the top face of the form from a true plane more than $\frac{1}{8}$ inch in 10 feet, and do not vary the vertical face of the form by more than $\frac{1}{4}$ inch.
9. The forms shall contain provisions for locking the ends of abutting form sections together tightly, and for secure setting.
10. Provide a foundation under the forms that is compact and true to the specified grade so that the whole length of the form will be set firmly in contact with the grade.

B. Form Setting

1. Set forms sufficiently in advance of the point where concrete is being placed so that line and grade may be checked.
2. After the forms have been correctly set, thoroughly tamp the grade mechanically at both the inside and outside edges of the base of the forms.
3. Stake forms into place with a minimum of 3 pins for each 10 foot section. Place a pin at each side of every joint.
4. Tightly lock form sections, free from play or movement in any direction.
5. Do not deviate the form from true line by more than $\frac{1}{4}$ inch at any point.
6. No excessive settlement or springing of forms under the finishing machine is permitted.
7. Clean and oil forms before the placing of concrete.

C. Grade and Alignment

1. Check the alignment and grade elevations of the forms immediately before placing the concrete and make any necessary corrections. When any form has been disturbed or any grade has become unstable, reset and recheck the form.

D. Removing Forms

1. Unless otherwise provided, do not remove forms from freshly placed concrete until it has set for a minimum of 12 hours, except auxiliary forms used temporarily in widened areas.
2. Remove forms carefully to avoid damage to the pavement.

3.5 SLIP FORM PAVING

A. Equipment

1. Use standard manufacture, slip form paving equipment capable of spreading, consolidating, screeding and float finishing freshly placed concrete in one pass. Use slip form equipment capable of producing a homogeneous pavement to the specified cross-section, profile and density.
2. Use slip form paving equipment that is automatically controlled (from a reference system) in regard to line and grade.
3. Use slip form paving equipment equipped with traveling side forms. The traveling side forms shall trail behind the paver a sufficient distance to prevent edge slump of the concrete pavement.
4. Use all the component parts recommended by the manufacturer of the slip form paving equipment.
5. If any unit of the paving train shall operate on adjacent pavement, protect the adjacent pavement.

B. Operations

1. Once the paving operation has started, provide adequate equipment and supply of materials to maintain continuous placement for any given working period. Keep all concrete conveying equipment clean.
2. Do not apply any tractive forces to the slip form paver, except that which is controlled from the machine.
3. Trim to grade the subgrade or surface of the base over which the tracks of the paver will travel. Do not disturb this surface with other equipment. If the equipment or method of operation requires the subbase to be wider than shown in the Drawings, place additional material to provide an adequate surface for the tracks of the paver.
4. Upon completion of the paving operations, remove or repair any base material damaged by the slip form paver's tracks. All necessary construction and removal of this additional base material is subsidiary to other items of the contract.
5. Operate the paver continuously, stopping only when absolutely necessary. If the forward motion of the paver is stopped, immediately stop the vibrator and tamping elements.
6. Deposit the concrete on the grade in successive batches to minimize re-handling. Place concrete over and against any joint assemblies so the joint assembly is retained in its correct position. Spread the concrete using approved mechanical spreaders to prevent segregation and separation of the materials.
7. After striking the concrete off with the spreader, leave sufficient concrete in place to allow the final shaping by the use of screeds, templates and pans, depending on make, model and type of machines approved for use in the paving train. Adjust the paving units to meet the required final cross-section, minimizing the need to carry back concrete to fill voids or depressions. Adjust each screed or template so a uniform roll of concrete

extends the full length of the screed or template and allows just enough concrete to pass under the unit to properly feed the next machine. Do not shove large volumes of concrete with the screed or template. Adjust the screed or template to maintain a uniform cross-section.

8. Use multiple spreaders for single and multiple lift operations. Place concrete ahead of the initial spreader strike off no more than 30 minutes ahead of the final spreader strike off.
9. The use of any paving machine in the paving train is contingent on its ability to finish the pavement satisfactorily to the required grade, section and specified degree of consolidation. The RPR may at any time require the adjustment, repair or replacement of the machine for unsatisfactory performance.
10. Correct any edge slump of the pavement in excess of $\frac{1}{4}$ inch, exclusive of edge rounding, before the concrete hardens. Excessive edge slumping will be sufficient reason to discontinue paving until machinery (or mix) is properly adjusted or removed from the project.
11. When the machine finishing has been completed, check the surface with a straightedge a minimum of 10 feet in length before texturing. Operate the straightedge parallel to the pavement centerline, starting at the center and progressing outward. Advance in successive stages of less than $\frac{1}{2}$ the length of the straightedge. At the Contractor's option, this requirement may be eliminated when smoothness is to be determined by the profilograph.
12. If any unit of the paving train shall operate on adjacent pavement, protect the adjacent pavement.

3.6 CONSOLIDATION AND FINISHING

- A. Perform hand spreading with shovels, not rakes. Do not allow workers to walk in the fresh concrete with boots or shoes coated with earth or foreign substance.
- B. Do not apply moisture to the surface of the concrete pavement unless the RPR approves the use of additional water on the fresh concrete surface to lubricate the float of the longitudinal finisher. If unusual weather conditions require the addition of superficial water to the concrete surface, apply it only in the form of a fine, fog mist.
- C. Consolidate and finish the concrete to the cross-section and elevation shown in the Drawings.
- D. Use vibrators or other approved equipment to consolidate each layer of concrete, when placed in more than 1 lift, or full depth if placed in 1 lift. Uniformly vibrate the concrete across the full width and depth of the pavement so that the density of pavement concrete is a minimum of 98% of the vibrated unit weight. The 98% density requirement may be eliminated on miscellaneous areas such as entrance pavement, median pavement and gore areas.
- E. Vibrators, either of the surface type (pan or screed) or the immersion type (tube or spud) may be attached to the spreader, paver or finishing machine, or may be mounted on a separate carriage. Only operate the vibrators when the machine they are mounted on is moving forward. Do not operate hand vibrators more than 15 seconds, or less than 5 seconds in any one location unless approved otherwise by the RPR. Place vibrators in and withdraw from concrete vertically in a slow deliberate manner.
- F. Additional requirements for vibrators for concrete pavement:

1. The frequency of vibration of surface, pan or screed vibrators shall be a minimum of 3,500 cycles per minute,
 2. The frequency of vibration of immersion tube vibrators attached to the paving machine shall be a minimum of 5,000 cycles per minute; and
 3. The frequency of vibration of immersion spud vibrators (both hand operated and gang mounted) shall be a minimum of 8,000 cycles per minute.
 4. In addition, when epoxy coated reinforcing steel is involved use vibrators with heads of rubber or other resilient material. Rubber covers securely fastened over steel heads shall be acceptable. The requirement does not apply to dowel bars and tie bars for pavement.
- G. Maintain a uniform, continuous roll of concrete over the vibrators ahead of the strike-off. The height of the roll shall be approximately the same height as the thickness of the pavement being vibrated.
- H. In order to obtain concrete consolidation in the vicinity of joint assemblies, the RPR may require that these areas be hand vibrated with an immersion spud vibrator.
- I. On projects or areas within projects where the use of conventional equipment is impracticable, other consolidation and finishing equipment may be used with approval of the RPR.

3.7 TEXTURING

- A. Provide a transverse or longitudinal tined finish where shown in the Drawings.
1. Use a burlap drag as soon as all excess moisture has disappeared and while the concrete is still plastic enough to make a granular surface possible.
 2. Following the dragging operation, make a final finish or texture of the surface of the plastic pavement with grooving equipment with a metal comb that is capable of producing a uniform pattern of longitudinal grooves approximately 3/16-inch-wide, spaced at 3/4 inch centers and 1/8 to 1/4 inch deep. Perform the operation at such time to minimize displacement of larger aggregate particles and before the surface permanently sets.
- B. Unless otherwise noted in the Drawings, parking lot pavement, curb and gutters, sidewalks, driveways, valley gutters and other similar exposed, slab on grade construction shall receive a light broom finish.
- C. Before final texturing, finish the exposed edge of the pavement to a radius of 1/4 inch with an edger. Edge the interior longitudinal joints on multiple-lane pavement to a radius of 1/8 inch. Eliminate any tool marks appearing on the slab adjacent to the joints or edge of the slab. Do not disturb the rounding of the corner of the slab.

3.8 JOINTS

- A. General
1. Construct joints according to the Drawings. Failure to construct the joints in the best possible manner will be cause for suspension of work until the cause of the defective work is remedied.

2. If existing pavement of any type is required to abut with the new pavement, and the termination of the removal is not at an existing joint, make the new joint by sawing the existing pavement full depth with a diamond saw before removal.
3. The objective is to create or form a plane of weakness in the fresh concrete before uncontrolled or erratic cracking occurs. The following methods are acceptable:
 - a. Use concrete saws to saw all contraction joints no wider than the initial saw cut and to a depth of $D/3 \pm 1/4$ inch. Extreme conditions could exist which make it impracticable to prevent erratic cracking by sawing the joints early. At the onset of the project, devise methods, with the approval of the RPR, to control this cracking.
 - b. Make a “plastic concrete cut” straight and well defined so it can be sawed out by the saw crew. The “plastic concrete cut” would replace the specified initial saw cut. Suggested procedures could be the use of a stiff metal parting strip, with or without handles that would be gently inserted in the fresh concrete and removed, thereby parting the interlocking coarse aggregate and providing a plane of weakness.
 - c. Cut the fresh concrete with a mason’s trowel and straightedge from a worker’s bridge. It is imperative that the “plastic concrete cut” joint and the second stage saw cut are in the same exact location.
 - d. At the Contractor’s option, “early entry” saws may be used based on satisfactory performance and depth of cut recommended by the equipment manufacturer.
 - e. Procedures to control erratic cracking are not limited to these examples.
4. Edge any transverse joint requiring hand finishing and edging with a tool having a radius of $1/8$ inch. Do not indent the surface of the pavement with the horizontal face of the edger.

B. Contraction Joints

1. Install contraction joints of the type, dimensions and spacing shown in the Drawings.
2. Dowel Joints
 - a. Stretch a string line along the centerline of the joint, or otherwise adequately mark it to assure dowel bar joint assembly alignment.
 - b. Install the dowel bar joint assembly so the centerline of the assembly is perpendicular to the centerline of the slab, and the dowels lie parallel to the slab surface and slab centerline. Place concrete so it will not displace or disarrange the joint assembly. Mark the location of contraction joints to assure the joints are sawed in the proper location.

C. Longitudinal Joints

1. Construct longitudinal joints according to the Drawings. When sawed joints are specified or used, provide approved guidelines or devices to cut the longitudinal joint on the true line as shown in the Drawings. Perform the sawing of longitudinal joints at a time that will prevent erratic or uncontrolled cracking. When “plastic concrete cut” methods are used, no sawing or widening of the joint will be required to make a sealant reservoir.

D. Construction Joints

1. Make a butt construction joint perpendicular to the centerline of the pavement at the close of each day’s work, or when the process of depositing concrete is stopped for a length of

time sufficient for the concrete to take its initial set. Form this joint by using a clean header having a nominal thickness of 2 inches, and minimum cross-sectional area equal to pavement thickness by pavement width. Cut the header true to the crown of the finished pavement. Accurately set and hold it in place in a plane at right angles to centerline and perpendicular to the surface of the pavement.

2. Protect the top surface of the header with steel. Securely fasten a trapezoidal piece of metal or wood approximately 2 inches wide and a minimum of 1 inch in depth on the face of the header, along the center of the header to form a grooved or keyed joint.
3. With approval of the RPR, the Contractor may pave beyond the joint location a distance to maintain the line and grade. Saw the construction joint when the concrete has hardened. Drill holes for reinforcing tie bars and epoxy the bars in-place. Place fresh concrete against the previously placed concrete taking care to avoid injury to the edge. Vibrate the concrete to obtain an interlocking joint and prevent a honeycombed face of the joint. The additional concrete, removal of debris and other work created by this alternative is at the Contractor's expense.
4. Unless shown otherwise in the Drawings, do not place any construction joint within 5 feet of an expansion, contraction or other construction joint.

E. Isolation (Expansion) Joint Construction

1. Isolation joints shall be formed around fixed objects, structures, walks and where indicated in the Drawings.

F. Special Joint Construction

1. Construct special joints as shown in the Drawings or as ordered by the RPR around drainage, utility and other structures located within the concrete pavement boundaries. Hold temporary forms securely in place during the concrete placement operation.

G. Joint Construction

1. Construct all joints as shown in the Drawings. Repair or replace any curing medium damaged during joint construction. Construct joints as follows:
 - a. Induced Plane of Weakness. The first saw cut is a relief cut at the proper joint location, approximately $\frac{1}{8}$ inch wide and to the full joint depth as shown in the Drawings ($D/3 \pm \frac{1}{4}$ inch). Make the relief cut as soon as the concrete has hardened enough so that no excess raveling or spalling occurs, but before any random cracks develop. The sequence of the relief sawing is at the Contractor's option, provided all relief sawing is completed before random cracking develops. Use suitable guidelines or devices to cut the joint straight and in the correct location. Repair curing membrane damaged during sawing as directed by the RPR. Alternate methods to the first stage sawing as specified in this Section may also be used.
 - b. Reservoir Construction. Do not perform widening of the relief joints to full width until the concrete is a minimum of 48 hours old. Delay it longer if the sawing causes raveling of the concrete. If second stage sawing is performed before completion of the curing period, maintain the cure by use of curing tapes, plastic devices or other materials approved by the RPR. Center the joint groove over the relief cut, and saw it to the dimensions shown in the Drawings. Should any spalling of the sawed edges occur that would detrimentally affect the joint seal, patch it with an approved epoxy patching compound and allow it to harden before

installing the joint material. Make each patch true to the intended neat lines of the finished cut joint.

H. Cleaning Joints

1. Immediately clean freshly cut sawed joints by flushing with a jet of water under pressure and other necessary tools to remove the resulting slurry from the joint and immediate area.
2. To clean the joints, use air compressors equipped with suitable traps capable of removing all surplus water and oil from the compressed air. When contaminated air is found to exist, work will be stopped until suitable adjustments are made, and the air stream is found to be free of contaminants.
3. Just before applying the hot or cold joint sealant, complete a final cleaning by air blasting to clean incompressibles from the joint.

I. Sealing Joints

1. The joint location, size and configuration is shown in the Drawings. Use applicable materials to obtain the required joint sealant configuration. Seal longitudinal pavement joints full depth with either a cold applied chemically cured joint sealant or a hot joint sealing compound. Use only 1 type of longitudinal joint sealant on a project, unless otherwise approved by the RPR. Seal joints before opening to traffic.
2. Cold Applied Chemically Cured Joint Sealants.
 - a. Do not seal joints until they are clean and dry, and the pavement has attained the age recommended by the manufacturer of the sealant. Do not apply sealant to damp concrete, or install it during inclement weather. Place the sealer full depth in close conformity with dimensions shown in the Drawings. Any deviation will be cause for rejection of the joint until satisfactory corrective measures are taken. Do not apply joint sealant when the ambient air temperature is below 40°F, or as specified by the manufacturer.
 - b. Apply the joint sealant by an approved mechanical device. Any failure of the joint material in either adhesion or cohesion will be cause for rejection. Repair the joint to the RPR's satisfaction.
 - c. Some cold applied, chemically cured sealants are not self-leveling and will not position properly in the joint under its own weight. Tool the sealant surface as shown in the Drawings. Accomplish tooling before a skin forms on the surface. The use of soap or oil as a tooling aid is prohibited.
 - d. After a joint has been sealed, promptly remove all surplus joint sealer from the pavement or structure surfaces.
 - e. Do not permit traffic over sealed joints until the sealer is tack free, or until debris from traffic cannot imbed into the sealant.
3. Hot Applied Joint Sealing Compound
 - a. Do not seal joints until they are clean and dry, and the pavement has attained the age recommended by the manufacturer of the joint sealing compound. Install joint sealing compound according to the manufacture's recommendations.
 - b. Completely clean out the application unit when changing brands of materials, or if the material exhibits any sign of changes in application characteristics, polymer or oil separation, balling or any signs of jelling. If the application unit contains

compatible material from a previous project at start-up, provide the RPR a certification covering the material in the application unit, including the manufacturer, type, etc. Material that cannot be identified and certified shall be completely cleaned out before start-up.

- c. After a joint has been sealed, promptly remove all surplus joint sealer from the pavement or structure surfaces.
- d. Do not permit traffic over sealed joints until the sealer is tack free, or until debris from traffic cannot imbed into the sealant.

3.9 PROTECTION AND CURING OF CONCRETE

- A. Cure the pavement by using burlap, liquid membrane-forming compounds, white polyethylene sheeting, concrete curing blankets or reinforced white polyethylene sheeting. Failure to provide proper curing is cause for immediate suspension of the concreting operations.
- B. Burlap, Concrete Curing Blankets, White Polyethylene Sheeting and Reinforced White Polyethylene Sheeting.
 - 1. Place the curing material on the pavement immediately after the pavement has been finished, and the concrete has hardened sufficiently to avoid harmful marring of the surface, yet early enough to prevent undue loss of moisture from the concrete. If the pavement becomes dry before the curing material is placed, moisten the concrete with a fine spray of water. Place burlap-polyethylene blankets with the dampened burlap side down. Dampen burlap and place on the surface. Keep burlap damp throughout the entire curing period.
 - 2. Lap adjacent units of curing materials approximately 18 inches. Upon removal of the forms, extend the material to completely cover the full depth of the exposed pavement.
 - 3. Weight the curing material down using continuous windrows of earth placed along the sides and edges of the pavement and transversely across the pavement on the laps to cause the material to remain in contact with the covered surface throughout the curing period. Other methods may be used with approval of the RPR.
 - 4. Walking on the pavement surface to place the curing material is prohibited. Walking on the curing material is prohibited until the pavement has cured sufficiently to prevent damage to the surface.
 - 5. Leave the curing material in place for a minimum of 4 days, unless otherwise directed by the RPR. Immediately repair any tears or holes appearing in the material during the curing period, or replace it with material in good condition.
 - 6. The material may be reused, provided it is kept serviceable by proper repairs, and if in the judgment of RPR it will provide water retention during the curing period.
- C. Liquid Membrane-Forming Compounds.
 - 1. After finishing operations have been completed and immediately after the free water has left the surface, completely coat and seal the surface of the slab with a uniform layer of white membrane curing compound. Apply the compound in 1 application at a minimum rate of 1 gallon per 150 square feet of surface. Thoroughly mix the curing compound at all times during usage. Do not dilute the white membrane curing compound.
 - 2. Protect the treated surface from injury a minimum of 4 days, unless otherwise directed by the RPR. If the newly coated film is damaged in any way, apply a new coat of material to the affected areas equal in coverage to that specified for the original coat. A minimum

of foot traffic will be permitted on the dried film as necessary to properly carry on the work, provided any damage to the film is immediately repaired by application of an additional coat of compound.

3. Immediately after the forms are removed (fixed form and slip form), coat the entire area of the sides of the slab with white membrane curing compound at the rate specified for the pavement surface, regardless of whether or not further concrete placement will be made against the pavement edge. Approved hand spray equipment will be permitted only for the application of curing compound on the sides of the slab, for repairing damaged areas and for hand finished areas. Repair any damaged areas caused by joint sawing.

3.10 OPENING TO TRAFFIC

- A. No motorized traffic is allowed on the pavement until all of the following conditions are met.

1. Construction Traffic Only

- a. The flexural strength of the pavement shall meet or exceed 450 psi. Determine the flexural strength of the pavement by testing flexural strength specimens utilizing the third point loading method, or by use of a calibrated maturity meter.
- b. If testing is not done, observe a 4-day curing period before allowing motorized traffic on the pavement.
- c. Provide protection to keep foreign material out of the unsealed joints by an approved method.

2. All Traffic

- a. In addition to requirements for Construction Traffic Only given above, the joints shall be sealed according to this Section.
- b. The pavement surface shall be swept and/or washed down to remove all dirt, debris or foreign materials prior to opening to traffic

3. The Contractor may, at own expense, increase the cement content from the minimum as per Division 03 Concrete to accelerate the strength gain of the Portland Cement Concrete Pavement.

3.11 COLD WEATHER CURING.

- A. Maintain the concrete pavement at a minimum temperature of 40°F, as measured along the surface of the concrete, for a minimum of 4 days after placing. When the ambient air temperature is expected to drop below 35°F, anytime during the curing period, take precautions to maintain the concrete temperature. Keep a sufficient supply of approved moisture barrier material, other than liquid curing compound, and suitable blanketing material, such as straw, hay and burlap close by. Be prepared to cover the pavement with a moisture barrier and protect all pavement less than 4 days old with blanketing material. Remove, dispose of and replace concrete damaged by cold weather, as determined by the RPR.

3.12 QUALITY CONTROL.

- A. Field testing and sampling of materials shall conform to the requirements of Division 03 Concrete.
- B. Laboratory testing of materials shall conform to the requirements of Division 03 Concrete.
- C. Correction of deficient materials shall conform to the requirements of Division 03 Concrete.

END OF SECTION

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SECTION 32 13 14
CONCRETE WALKS AND PADS

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. Concrete sidewalks.
2. Concrete equipment pads.

- B. Related Sections:

1. Section 03 11 00 - Concrete Forming: Forms for site concrete.
2. Section 03 20 00 - Concrete Reinforcing: Reinforcement for site concrete.
3. Section 03 30 00 - Cast-In-Place: Concrete for sitework.

1.3 REFERENCES

- A. Americans With Disabilities Act (ADA):

1. ADA; Americans with Disabilities Act; Federal Register, Volume 56, No. 144 28 CFR part 36.

- B. American National Standards Institute (ANSI):

1. ANSI/ICC A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; International Code Council.

- C. American Concrete Institute (ACI):

1. ACI 301 - Specifications for Structural Concrete for Buildings.
2. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
3. ACI 305R - Hot Weather Concreting.
4. ACI 306R - Cold Weather Concreting.
5. ACI 308 - Standard Practice for Curing Concrete.

- D. American Society for Testing and Materials (ASTM):

1. ASTM A 185 - Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
2. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
4. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
5. ASTM C 1193 - Standard Guide for Use of Joint Sealants.

6. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (non-extruding and Resilient Bituminous Types).

1.4 SUBMITTALS

- A. Submit as part of submittal for Section 03 30 00.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Follow recommendations of ACI 305R when concreting during hot weather. C. Follow recommendations of ACI 306R when concreting during cold weather.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Form Materials: Specified in Section 03 11 00.
- B. Wood form material, profiled to suit conditions.
- C. Joint Filler: ASTM D 1751 preformed; non-extruding bituminous type.
 1. Thickness: 1/2 inch.

2.2 REINFORCEMENT

- A. Reinforcing: Specified in Section 03 20 00.
- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed billet bars, unfinished, sizes indicated on Drawings.
- C. Welded Wire Fabric: ASTM A 185, Grade 65, steel spot welded at intersections; sizes indicated on Drawings.

2.3 CONCRETE

- A. Concrete Materials: Specified in Section 03 30 00.
- B. Concrete Materials: ASTM C 94; Normal Portland Cement.

- C. Compressive Strength: Minimum compressive strength of 3,500 psi at 28 days with air-entraining admixture providing minimum 4 percent and maximum 6 percent air by volume.

2.4 ACCESSORIES

- A. Joint Sealer: Specified in Section 07 90 00.
- B. Joint Sealer: Polyurethane, self-leveling; ASTM C 920, Class 25, traffic grade, gray color.
- C. Sand Cushion: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify compacted subgrade is acceptable and ready to support walks, pads and imposed loads.
 - 2. Verify gradients and elevations of base are correct.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Subgrade: Prepare by compacting the top 8 inches of subgrade to 95 percent optimum density with moisture content between 2 percent below and 2 percent above optimum moisture density.
- B. Sand Cushion: Place a minimum 2 inch thick sand cushion on subgrade and compact.

3.3 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient. Set forms with upper edge true to line and grade held in place with stakes spaced maximum 48 inches on center.
- B. Set forms to provide smooth surface water flow over finished walk or pad. Finished walks or pads shall not create ponding either on or behind finished walk or pad.
- C. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

- D. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 REINFORCEMENT

- A. Place reinforcement as indicated on Drawings.
- B. Place dowels to achieve pavement and curb alignment as indicated on Drawings.

3.5 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R and ACI 302.1R.
- B. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. After concrete placement, use strike-off guided by side forms to bring surface to proper level and consolidate. Correct irregularities.
- E. Curing:
 - 1. Moisture cure sidewalk and pad surfaces in accordance with ACI 308.
 - 2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep concrete surfaces continually moist by water ponding, spraying or absorptive mat.
 - a. Ponding: Maintain 100 percent coverage of water over concrete slab areas, continuously for 4 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
 - c. Absorptive Mat: Saturate burlap-polyethylene with water and place burlap-side down over floor slab areas, lapping ends and sides minimum 4 inches sealed with waterproof tape; maintain in place for 7 days.
 - 3. Begin final curing after initial curing but before surface is dry by absorptive mat.

3.6 JOINTS

- A. Sidewalks:
 - 1. Align curb, gutter, and sidewalk joints.
 - 2. Divide surfaces into square areas using contraction joints spaced not more than the width of walk and maximum 10 feet on center, unless indicated otherwise on Drawings.
 - 3. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate walks from vertical surfaces and other components and in pattern indicated on Drawings.
 - a. Form joints with joint filler extending from bottom of concrete to within 1/2 inch of finished surface.
 - b. Secure to resist movement by wet concrete.

4. Provide scored joints:
 - a. At 3 feet intervals.
 - b. Between sidewalks and curbs.
 5. Provide keyed construction joints as indicated on Drawings or when there is an interruption of concrete placement.
 6. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.
- B. Pads:
1. Divide pad surfaces into square areas using contraction joints spaced not more than the width of pad and maximum 10 feet on center, unless indicated otherwise on Drawings.
 2. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate pads from vertical surfaces and other components and in pattern indicated on Drawings.
 - a. Form joints with joint filler extending from bottom of concrete to within 1/2 inch of finished surface.
 - b. Secure to resist movement by wet concrete.

3.7 HANDICAPPED RAMPS

- A. Form, place and finish handicapped ramps in compliance with ADA, ANSI/ICC A117.1 and as indicated on Drawings.

3.8 FORMED CONCRETE STAIRS

- A. Form concrete stairs as indicted on Drawings.
- B. Place metal stair nosing at each tread as specified in Section 05 50 00.

3.9 FINISHING

- A. Non-Slip Broom: Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- B. Edging: Finish sidewalk and pad edges, including those at formed joints, with edging tool having 1/4 inch radius. Edge transverse joints before brooming.

3.10 JOINT SEALING

- A. Clean and prime joints, and install sealant in accordance with manufacturer's published instructions and ASTM C 1193.
- B. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

3.11 CONSTRUCTION

- A. Site Tolerances:

1. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.

3.12 FIELD QUALITY CONTROL

- A. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

3.13 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over site concrete for 7 days minimum after finishing.

END OF SECTION

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SECTION 32 17 23
PAVEMENT MARKINGS

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. Driveway and parking lot striping.
2. Painted pavement markings at handicapped parking stalls.
3. Pavement Markings Schedule, at end of Section.

- B. Related Sections:

1. Section 32 13 13 - Concrete Pavement: Paving substrate for marking application.

1.3 REFERENCES

- A. Americans with Disabilities Act (ADA):

1. ADA - Americans with Disabilities Act; Federal Register, Volume 56, No. 144 28 CFR part 36.

- B. American National Standards Institute (ANSI):

1. ANSI/ICC A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; International Code Council.

- C. U.S. General Services Administration (GSA):

1. GSA FS TT-P-115E - Traffic Paint.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.

1. Product Data: Technical data sheets indicating manufacturer's catalog number, paint type description, and VOC content.

- B. Section 01 78 00 - Closeout Submittals: Requirements for closeout submittals.

1. Installation Certification: Submit written certification of installation on form located at end of Section.

1.5 QUALITY ASSURANCE

- A. Application Qualification: Provide qualified technician to supervise equipment and application of marking.
- B. Regulatory Requirements:
 - 1. Provide paint and coating materials that conform to Federal, State, and Local restrictions for Volatile Organic Compounds (VOC) content.
- C. Manufacturer Installation Instructions: Contractor shall maintain current copy of pavement marking paint manufacturer published installation instructions in Project Field Office and refer to instructions at all times during installation.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Deliver, store, protect and handle products.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Deliver Material Safety Data Sheet (MSDS) for each material to Project Field Superintendent for Contractor Records.
- E. Accept Products on site in manufacturer's packaging. Inspect for damage. Return damaged Products and replace with undamaged Products.
- F. Project Field Superintendent shall inspect Products immediately upon delivery to Project Site, determine Product conformance with specified requirements and reject Products not complying with specifications. Project Field Superintendent shall direct that non-complying Products be removed from Project Site immediately.
- G. Paint Materials: Store at minimum ambient temperature of 45°F and a maximum of 90°F, in ventilated area, and as required by manufacturer's instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Aexcel Corporation: www.aexcelcorp.com.

- B. Ennis Paint, Incorporated: www.ennispaint.com
- C. Trantex, Incorporated: www.trantexinc.com.
- D. Section 01 25 00 - Substitutions Procedures: For substitutions.

2.2 TRAFFIC PAINT

- A. Chlorinated Rubber VOC Compliant Zone Marking Paint conforming to GSA FS TT-P-115E Type III, white, yellow, blue or red, lead free.
- B. Application Dry Film Thickness (DFT): 15 mils.
- C. Drying Time: 15 minutes at 77°F.
- D. Application Equipment: Airless spray.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Remove dust, dirt and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
- B. Remove rubber deposits, residual curing compounds and other coatings adhering to pavement by water blasting.
- C. Allow new paving to cure for minimum 30 days before application of pavement markings.
- D. Testing for Moisture: Test pavement surface for moisture before beginning marking application after each period of rainfall, fog, high humidity, or cleaning, or when ambient temperature has fallen below dew point.
 - 1. Plastic Wrap Test Method:

1. Cover pavement with 12 inch x 12 inch section of clear plastic wrap and seal edges with tape.
 2. After 15 minutes, examine plastic wrap for any visible moisture accumulation inside plastic.
 3. Do not begin pavement marking until test can be performed with no visible moisture accumulation inside plastic wrap.
- E. Layout pavement markings using guidelines, templates and forms.
- F. Clean, test and check application equipment for proper film thickness and adjust pressure or speed to obtain specified mil thickness and uniform line thickness.
- G. Protect adjacent curbs, walks, fences and other items from pavement marking application.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions using application procedures approved for application and substrate.
- B. Do not apply finishes to surfaces that are not dry and if rain is expected within 24 hours.
- C. Apply materials at not less than manufacturer's recommended spreading rate. Provide minimum dry film thickness (DFT) of entire coating system as specified.
- D. Apply stripes straight and even with sharp edges.
- E. Apply stripes and other markings in widths and colors indicated in Schedule.

3.4 CLEANING AND PROTECTION

- A. Remove overspray, spills, or drips from surfaces.
- B. Barricade marked areas until marking paint is dry and ready for traffic.

3.5 WASTE DISPOSAL

- A. Dispose of all paint and related materials in conformance with all State and local environmental and waste disposal regulations at approved waste disposal location.

3.6 FIELD QUALITY CONTROL

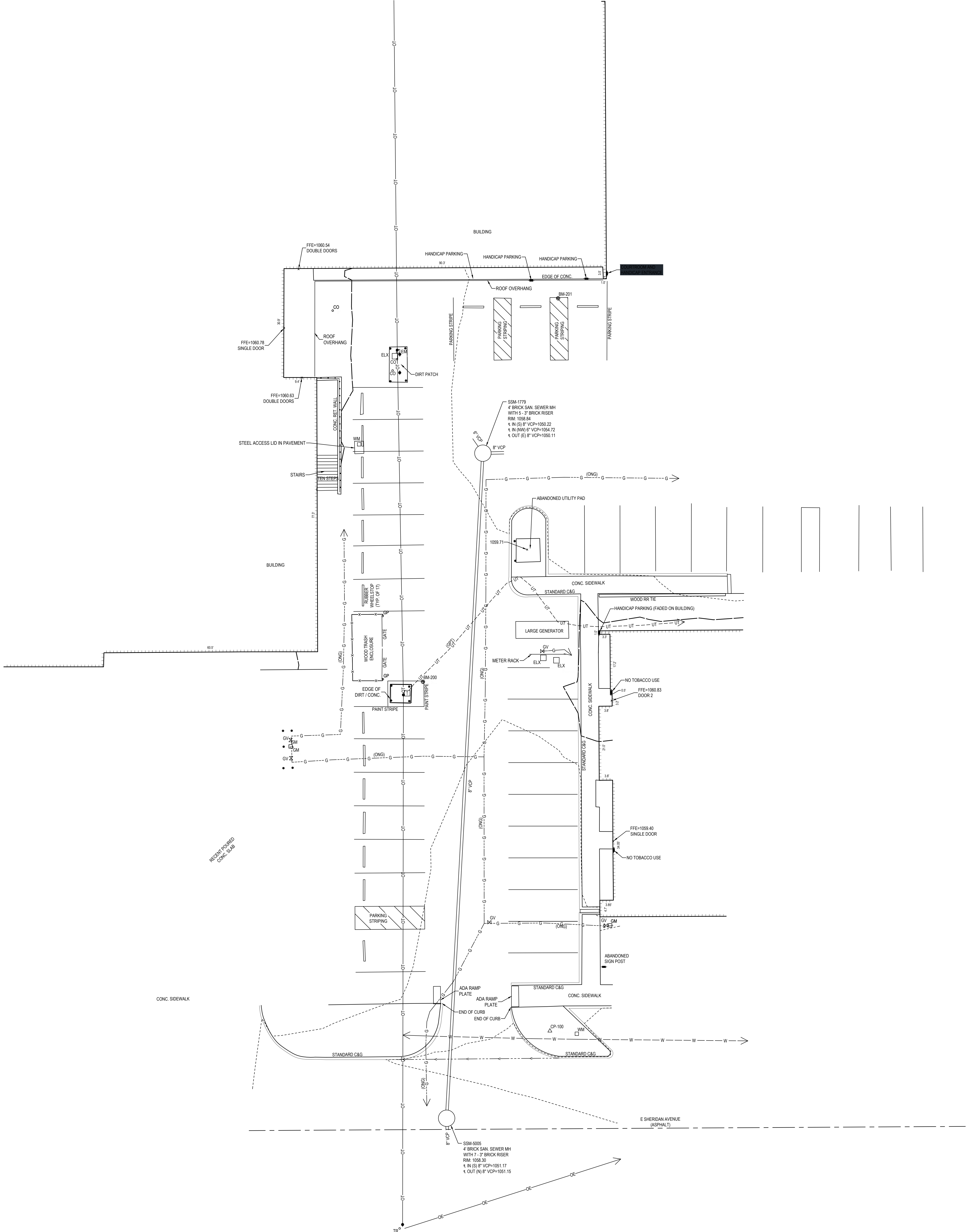
- A. Section 01 40 00 - Quality Requirements: Perform contractor quality control inspections.
1. Inspect pavement marking application for material, color, sheen, specified mil thickness, coverage, dimensions and layout.
 2. Document preparatory, initial and follow-up inspection in Contractor Test and Inspection Reports and submit to Architect.
- B. Correct deficiencies in products and installation found not to be in compliance with Contract Documents.

3.7 SCHEDULE - PAVEMENT MARKINGS

- A. Paint the following items at locations and spacings indicated on Drawings per ODOT traffic signing standard.
1. Parking Stall Stripping: 4 inch wide, White.
 2. Directional Arrows and Graphics: Yellow, configuration as indicated on Drawings.
 3. Handicapped Parking Stall Striping: 4 inch wide with diagonals where indicated, International Handicapped Blue in accordance with ADA and ANSI/ICC A117.1.
 4. Handicapped Parking Stall Symbol: International Symbol of Accessibility, white graphic on 36 inch x 36 inch on International Handicapped Blue background in accordance with ADA and ANSI/ICC A117.1.
 5. Curbs Marked as Fire Lane: Paint curbs red with white text markings NO PARKING FIRE LANE (Or as directed by Authorities Having Jurisdiction).

END OF SECTION

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UTILITY LOCATE NOTE:
OKIE811
TICKET NUMBERS:
TICKET NO: 23121311031956 ORIGINAL CALL DATE: 12/13/2023 11:03:13 AM

MEMBERS NOTIFIED
(RESPONSE):
KINGFISHER CITY OF T09446
(NO RESPONSE)
GRIDHAWK/PIONEER TELEPHONE (GPT) S01138
(RESPONSE - MARKED COPPER DROP ON PROPERTY)
OKLAHOMA NATURAL GAS (ONG) - WEST S00444
(RESPONSE - MARKED 3.5\"/>

CONTROL SUMMARY
HORIZONTAL DATUM/COORDINATE SYSTEM: NAD 83 (2011) OKLAHOMA NORTH ZONE
PROJECT COORDINATE SYSTEM: (GRID) ON DESCRIBED COORDINATE SYSTEM
VERTICAL DATUM: NAVD 88
SCALE POINT: NORTHINGS: 0
EASTINGS: 0
COMBINED ADJUSTMENT FACTOR (CAF): GROUND TO GRID=0.99991312
GRID TO GROUND=1.000068833
DISTANCE UNITS: US SURVEY FEET

HORIZONTAL CONTROL POINTS

CP-100
N: 313.039.2230 E: 1.988,686.0960

BLUE PEC CONTROL CAP

1. 41.0' W TO POWER POLE
2. 8.0' E TO WATER METER
3. 34.5' NE TO GAS METER

CP-101
N: 313.178.3180 E: 1.988,812.9790

BLUE PEC CONTROL CAP

1. 7.5' NE TO POWER POLE
2. 15.0' NW TO CONCRETE CURB
3. 42.0' SW TO BUILDING CORNER

BENCH MARKS

BM-200
ELEV: 1,059.43 (NAVD 88)

CUT BOX ON CONCRETE PARKING LOT

BM-201
ELEV: 1,058.55 (NAVD 88)

CUT BOX ON CONCRETE PARKING LOT

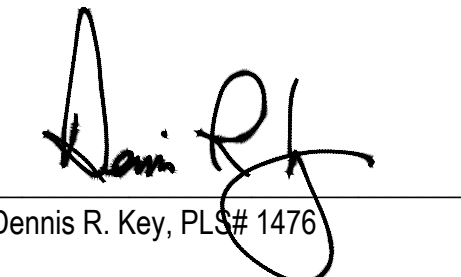
GENERAL NOTES

1. ALL ITEMS IN THIS SURVEY ARE DEPICTED IN THE LEGEND, BUT NOT ALL ITEMS IN THE LEGEND ARE DEPICTED IN THE SURVEY.
2. ALL UNDERGROUND UTILITIES DEPICTED ON THIS DRAWING NOT DENOTED AS "RECORD" HAVE BEEN MARKED ON THE GROUND BY THE OWNER AND/OR PUBLIC LOCATING SERVICE PER THE INCLUDED UTILITY LOCATE TICKETS. THE LOCATIONS SHOWN ON THE DRAWING ARE THE REPRESENTATIONS OF THESE MARKINGS. THESE UTILITIES WERE NOT EXCAVATED AND PHYSICALLY LOCATED BY THE SURVEYOR. ANY UTILITY NOT FIELD LOCATED BY THE OWNER AND/OR PUBLIC LOCATING SERVICE MAY NOT BE DEPICTED ON THIS DRAWING.
3. UTILITIES NOTED WITH "RECORD" IN THE DESCRIPTION HAVE BEEN DRAFTED FROM AVAILABLE RECORD INFORMATION AND THE PROPERTIES (LOCATION, SIZE, TYPE, ETC.) HAVE NOT BEEN VERIFIED IN THE FIELD.
4. GRAVITY FLOW UTILITIES SHOWN (SANITARY AND STORM SEWER) HAVE BEEN IDENTIFIED, LOCATED, AND MEASURED AT EACH MANHOLE OR CULVERT END. A REASONABLE ASSUMPTION IS MADE THAT THE LINES ARE Laid STRAIGHT BETWEEN STRUCTURES BUT THIS ALIGNMENT HAS NOT BEEN EXCAVATED AND PHYSICALLY VERIFIED IN THE FIELD.
5. ANY PROPERTY BOUNDARY INFORMATION SHOWN ON THIS DRAWING IS FOR REFERENCE ONLY AND DOES NOT CONSTITUTE A BOUNDARY SURVEY.

LEGEND

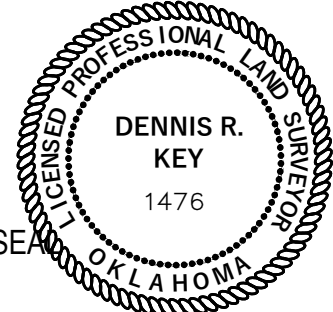
UNDG. GAS LINE	--- G ---	HORIZONTAL CONTROL POINT	Δ CP-#	GATE POST	o GP	VITRIFIED CLAY PIPE	VCP
UNDG. TELEPHONE LINE	--- OT ---	BENCH MARK	⊙ BM-#	GAS VALVE	✕ GV	SANITARY SEWER MANHOLE	SSM
UNDG. TELEPHONE LINE	--- UT ---	TELEPHONE BOX	☐	GAS METER	☐ GM	CONCRETE	CONC
SANITARY SEWER PIPE	---	TELEPHONE POLE	⬢	ELECTRICAL METER	⬢ EM	CURB AND GUTTER	C&G
WATER LINE	--- W ---	TELEPHONE RISER	o TR	ELECTRICAL BOX	☐ ELX	ELEVATION	EL
FENCE	--- X ---	CLEANOUT	o CO	ELECTRICAL POWER/TRANSMISSION POLE	⬢	FINISH FLOOR ELEVATION	FFE
STORM SEWER PIPE	---	WATER METER	o WM	STORM DRAIN MANHOLE	⊙	OVERHEAD	OH
ROAD CENTERLINE	---	SIGN	⬢			NOT TO SCALE	N.T.S.
OVERHEAD ELECTRIC LINE	---	GUARD POST	⊙			CENTERLINE	CL
HAZARDOUS CONTAINMENT	---	SANITARY SEWER MANHOLE	⊙			RETAINING	RET
MINOR CONTAINMENT	---						

TOPOGRAPHIC SURVEY CERTIFICATION
I, Dennis R. Key, certify that this project was completed under my direct and responsible charge from an actual survey made under my supervision; that this ground survey was performed at the 95% confidence level to meet Federal Geographical Data Committee Standards; that this survey was performed to meet the Specifications for Topographic and Planimetric Mapping contained in the Oklahoma Minimum Standards for the Practice of Land Surveying as adopted by the Oklahoma State Board of Licensure for Professional Engineers and Land Surveyors. The original data was obtained on January 10, 2024; that the survey was completed on February 22, 2024; all coordinates are based on Oklahoma Coordinate System of 1983 North Zone and all elevations are based on Mean Sea Level NAVD 88 Adjusted.


Dennis R. Key, PL# 1476

3 / 20 / 2024
Date of signature

2 / 22 / 2024
Date of last site visit



APEC PROFESSIONAL ENGINEERING CONSULTANTS P.A. 1101 S. WESTERN AVE., STE. 100 OKLAHOMA CITY, OK 73101 (405) 242-8800 www.apec.com		101 S MAIN STREET KINGFISHER, OK		CA#1046 EXPIRATION DATE: 06/30/2025 KINGFISHER COUNTY, OK	PROJ. NO. 230855-001 DATE: 09/12/2024
NO.	REVISION	BY	DATE		



SPM SERVICES

SUBMITTAL PACKAGE

PROJECT NAME Kingfisher County Parking Lot (Project # 2303)

LOCATION 101 S Main. Kingfisher, OK 730750

OWNER Kingfisher County Commissioners **DATE** 11/29/2023

Official Reviewer:

Gang Li – Architects In Partnership, LLC
3220 Marshall Ave.
Norman, OK 73072

Submitted by:

Alex Pinon – SPM Services, LLC
PO Box 904
Mustang, OK 73024

Package Number	Rev	CSI Code	Subject	Due Date	Response
32 13 13	0	32 13 13	Bollenbach – Concrete Pavement Mix Design		
32 11 24	0	32 11 24	Dolese – Aggregate		
03 39 00	0	03 39 00	WR Meadows Concrete Cure		
07 90 00	0	07 90 00	Sikaflex - Joint Sealer		
32 17 43	0	32 17 43	Warmup – Snow Melting System		

Approval Stamps	
<p>STATUS REVIEWED</p> <p>This submittal/drawing has been reviewed for General Arrangement and coordination of this work with all other trades.</p> <p>This review does not relieve the subcontractor of the responsibility for all dimensions, correct fabrication and conformity with the requirements of the contract or relieve the architect of his approval for design.</p> <p>DATE - 11/30/2023</p> <p>SIGNED - Alex Pinon</p> <div>APPROVED</div>	<div><div>SUBMITTAL REVIEW</div><div><div><input type="checkbox"/> APPROVED AS SUBMITTED</div><div><input checked="" type="checkbox"/> APPROVED AS NOTED</div><div><input type="checkbox"/> REVISE AND RETURN CORRECTED COPY</div></div><div><div><input type="checkbox"/> REVISE AND RESUBMIT</div><div><input type="checkbox"/> NOT APPROVED</div><div><input type="checkbox"/> OTHER ACTION SEE COMMENTS</div></div></div> <div><p>THIS PREVIEW HAS BEEN CONDUCTED UNDER THE PARAMETERS ESTABLISHED IN THE CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AS SUPPLEMENTED</p><div><div>SIGNED: Gang Li</div><div>DATE: 2:19 pm, Dec 01, 2023</div></div><div><p>ARCHITECTS IN PARTNERSHIP ARCHITECTURE • INTERIORS • PLANNING COMMENTS</p></div></div>

BOLLENBACH

Owner/Customer : Bollenbach Date: 11/28/23
Project / Location : Kingfisher Courthouse
Application : Cast In Place
Specifications : 4000 PSI
Mix name : Kingfisher Courthouse

Concrete mix design data :

#Total Cementitious Material	530	lbs
% Fly Ash (by weight of total)	15	%
Pounds Course Agg./cu.yd.	1850	lbs
% 1"	100	%
Air content (including entrapped air)	6.0	%
Gallons water /cu. yd. (s.s.d.)	28.0	gallons

One cubic yard weights (SSD)

Cement	LaFargeHolcim Type II	451	Lbs
Fly Ash	Lafarge Class C	80	Lbs
Limestone	Dolese Crushed #57	1,850	Lbs
Pea Gravel			Lbs
Natural Sand	Lightle Supplied River	1,236	Lbs
Water	28 Gallons	233	Lbs
Water-reducer	EnviroMix 330	47.7	oz.
Air Entrainment	Chryso Air G100	2.1	oz.

Water Cement Ratio, Lb/Lb	0.44
Unit Weight, Plastic Concrete	142.6



Submittal Date: 1 November 2023

Submittal #: 23-TCC-641

Bollenbach Concrete Inc.

517 N. 3rd St.

Kingfisher, OK 73750

CONCRETE

SAND & GRAVEL

STONE

BLOCK

MASONRY

To comply with your request, the following data is submitted for the coarse aggregate material which we propose to furnish for the subject project.

Source: Dolese Bros. Co., Richards Spur Quarry - Elgin, Oklahoma

Physical Properties:	LA Abrasion (B,500)	24 %	Fractured Faces (Total)	100 %	
	Absorption	0.38 %	MgSO4 Soundness	2 %	
	Specific Gravity (SSD)	2.69	Na2SO4 Soundness	0 %	
Designation:	1 1/2" ASTM C33 Size #57		Sieve Size	Percent Passing	Specification
Specification:	American Society for Testing and Materials (ASTM) C-33; American Association of State Highway & Transportation Officials (AASHTO) M-80; Oklahoma Department of Transportation (ODOT) Standard Specifications for Highway Construction, Edition of 2019: 701.06, Coarse Aggregate for Portland Cement Concrete		1 1/2"	100	100
			1"	98	95 – 100
			1/2"	31	25 – 60
			#4	6	0 – 10
			#8	4	0 – 5
			#200	1.2	0 – 1.5
Designation:	1" ASTM C33 Size #67		Sieve Size	Percent Passing	Specification
Specification:	American Society for Testing and Materials (ASTM) C-33; American Association of State Highway & Transportation Officials (AASHTO) M-80; Oklahoma Department of Transportation (ODOT) Standard Specifications for Highway Construction, Edition of 2019: 701.06, Coarse Aggregate for Portland Cement Concrete		1"	100	100
			3/4"	94	90 – 100
			3/8"	31	20 – 55
			#4	6	0 – 10
			#8	2	0 – 5
			#200	1.1	0 – 1.5

Dolese Bros. Co.

Tyler Clark

Tyler Clark – Aggregate Quality Supervisor

DOLESE BROS. CO.

8300 N. Oklahoma Ave

Oklahoma City, OK 73114

405.235.2311

dolese.com

Area Offices

202 S.E. J Ave
3400 N. Lincoln Blvd.
7648 E. 46th Place

Lawton, OK 73501 (580) 353-0872
Oklahoma City, OK 73105 (405) 528-0541
Tulsa, OK 74145 (918) 289-0005

Report On: Fine Aggregate Sieve

Lab No: 68408-1

Report No: 68408-1

File ID: 2007-0371

Acct ID: 0720LSC15

Page 1 of 1

Client: Lightle Sand Construction, LLC
David
P.O. Box 242
Hennessey, OK 73742

Project: Producer's Information

Report Date: 11/20/2023

Location: Stockpile

Sample Date: 11/14/2023

Sampled By: Client

Material: Fine Aggregate

By Order Of: David Dollar

Tested By: Pamela Plank

Description: Concrete Sand

<u>Sieve</u>	<u>% Passing</u>	<u>Required</u>
3/8 in	100	100
No. 4	99	95-100
No. 8	90	80-100
No. 16	69	50-85
No. 30	41	25-60
No. 50	9	5-30
No. 100	1	0-10
No. 200	0.2	0-3

Remarks: F.M. 2.91

Test Method (As Applicable): AASHTO T27

Orig: Lightle Sand Construction, LLC (Hennessey, OK)
Attn: David (1-ec copy)
1-ec Lightle Sand Construction, LLC Attn: Diann Hoover

Respectfully Submitted,
Standard Testing and Engineering Company

Pamela S. Plank

Certified Field Technician

THIS REPORT APPLIES ONLY TO THE STANDARDS OR PROCEDURES INDICATED AND TO THE SAMPLE(S) TESTED AND/OR OBSERVED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS OR PROCEDURES, NOR DO THEY REPRESENT AN ONGOING QUALITY ASSURANCE PROGRAM UNLESS SO NOTED. THESE REPORTS ARE FOR THE EXCLUSIVE USE OF THE ADDRESSED CLIENT AND ARE NOT TO BE REPRODUCED WITHOUT WRITTEN PERMISSION.

REPORT CREATED BY ElmTree SYSTEM



October 18, 2023

MANUFACTURER'S CERTIFICATION

This is to certify that CHRYSO® Air G 100, manufactured by CHRYSO, Inc. is compatible for use in Portland cement concrete and concrete containing fly ash, Portland-pozzolan cements and GGBF.

This is to certify that CHRYSO® Air G 100 is manufactured under strict quality control conditions and conforms to the mandatory requirements of the following specifications:

American Society For Testing and Materials.....ASTM C-260

United States Corps of Engineers.....CRD C-13

American Association of State Highway and
Transportation Officials.....AASHTO M-154

We further certify that CHRYSO® Air G 100 remains the same in uniformity and equivalence as originally submitted for testing. The approximate chloride content of CHRYSO® Air G 100 determined by independent testing laboratory

CHRYSO® Air G 100	230 ppm	0.023%
-------------------	---------	--------

No chlorides are added during the manufacturing process.

Admixtures from the CHRYSO product lines may not be compatible with other manufacturer's product lines.

A handwritten signature in cursive script, reading "Brian D. Breitzman".

Brian D. Breitzman
R & D and Quality Manager - North America



October 18, 2023

MANUFACTURER'S CERTIFICATION

This is to certify that CHRYSO® EnviroMix® 330, manufactured by CHRYSO Inc. is compatible for use in Portland cement concrete and concrete containing fly ash, Portland-pozzolan cements and GGBF.

This is to certify that CHRYSO® EnviroMix® 330 is manufactured under strict quality control conditions and conforms to the mandatory requirements of the following specifications:

American Society For Testing and Materials.....ASTM C-494, Type A & F

United States Corps of Engineers.....CRD C-87

American Association of State Highway and
Transportation Officials.....AASHTO M-194, Type A & F

We further certify that CHRYSO® EnviroMix® 330 remains the same in uniformity and equivalence as originally submitted for testing. The approximate chloride content of CHRYSO® EnviroMix® 330 determined by independent testing laboratory

CHRYSO® EnviroMix® 330

30 ppm

0.003%

No chlorides are added during the manufacturing process.

Admixtures from the CHRYSO product lines may not be compatible with other manufacturer's product lines.

Brian D. Breitzman
R & D and Quality Manager - North America





MasterFormat: 03 39 23

MAY 2021
(Supersedes August 2016)

1600-WHITE

Water-Based, Wax-Based Concrete Curing Compound

DESCRIPTION

The 1600-WHITE series of water-based, white-pigmented concrete curing compounds are wax-based dispersions with selected white pigments. When properly applied, 1600-WHITE forms a premium-grade membrane, which optimizes water retention. The white pigment reflects the sun's rays to help keep the concrete surface cooler and prevent excessive heat buildup.

USES

1600-WHITE is ideal for application on exterior, horizontal surfaces, such as highways, airports, and street and curb paving. 1600-WHITE is not recommended for residential applications. The product provides optimum curing when protection from the sun's heat is desired.

FEATURES/BENEFITS

- When properly applied, provides a premium-grade film, which optimizes water retention.
- Protects by reflecting the sun's rays to keep the concrete surface cooler and prevent excessive heat buildup, which can cause thermal cracking.
- Furnished as a ready-to-use, true water-based compound.
- Produces hard, dense concrete ... minimizes hair checking, thermal cracking, dusting, and other defects.
- Offers a compressive strength significantly greater than improperly or uncured concrete.
- Increases tensile strength for greater resistance to cracking and surface crazing.
- Improves resistance to the abrasion and corrosive actions of salts and chemicals ... minimizes shrinkage.
- Applies quickly and easily with conventional commercial spray equipment.
- VOC compliant.

PACKAGING

5 Gallon (18.93 L) Pails
55 Gallon (208.20 L) Drums

COVERAGE

Approximately 200 ft.²/gal. (4.91 m²/L). Coverage rates may have to be adjusted in windy conditions.

SHELF LIFE

When stored indoors in original, unopened containers at temperatures between 40° - 90° F (4° - 32° C), optimum performance and best use is obtained within one year of date of manufacture.

SPECIFICATIONS

- ASTM C 309, Type 2, Class A
- AASHTO M 148, Type 2, Class A
- FAA Spec. Item P-610-2.11 (e)
- Complies with all current federal, state, and local maximum allowable VOC requirements, including CARB, Arizona Maricopa County, Colorado AIM, OTC Phase I and II, Utah Department of Environmental Quality, U.S. EPA, and SCAQMD

TECHNICAL DATA

VOC Content: 59 g/L

APPLICATION

Surface Preparation... Application equipment must be clean and free of any previously used materials.

Mixing... Any settling or separation in the container must be re-dispersed with gentle agitation prior to use. CAUTION: TO AVOID FOAMING, DO NOT MIX EXCESSIVELY. DO NOT THIN.

Application Method... Spray on in one even coat with a hand or power sprayer, such as a Chapin 1949, as soon as the surface water disappears from concrete surface. Use a spray

CONTINUED ON THE REVERSE SIDE...

W. R. MEADOWS, INC.

P.O. Box 338 • HAMPSHIRE, IL 60140-0338
Phone: 847/214-2100 • Fax: 847/683-4544
1-800-342-5976
www.wrmeadows.com • info@wrmeadows.com

HAMPSHIRE, IL / CARTERSVILLE, GA / YORK, PA
FORT WORTH, TX / BENICIA, CA / POMONA, CA
GOODYEAR, AZ / MILTON, ON / SHERWOOD PARK, AB

nozzle that produces a flow of 0.5 GPM (1.89 LPM) under 40 psi (.276 MPa) of pressure.

Drying Time... Typically dries in two hours, depending on jobsite conditions (temperature, wind, etc.). Restrict foot traffic for at least four hours.

Cleanup... Immediately clean tools, equipment and overspray with soap and warm water.

PRECAUTIONS

KEEP FROM FREEZING. Do not apply when the temperature of the air and/or the concrete is less than 40° F (4° C). DO NOT MIX OR DILUTE WITH ANY OTHER PRODUCTS OR LIQUIDS. Do not use on surfaces that are later to be painted, tiled, hardened, sealed, or treated in any manner. Do not use on patios, sidewalks, or other areas where there is typically no wheel traffic to abrade the white film surface. Not recommended for use on residential applications.

HEALTH AND SAFETY

Direct contact may result in mild irritation. Read and follow all application, label, precautions, and health and safety information prior to use. Refer to Safety Data Sheet for complete health and safety information.

For most current data sheet and SDS, visit www.wrmeadows.com.



LIMITED WARRANTY

W. R. MEADOWS, INC. warrants at the time and place we make shipment, our material will be of good quality and will conform with our published specifications in force on the date of acceptance of the order. Read complete warranty. Copy furnished upon request.

Disclaimer

The information contained herein is included for illustrative purposes only, and to the best of our knowledge, is accurate and reliable. W. R. MEADOWS, INC. cannot however under any circumstances make any guarantee of results or assume any obligation or liability in connection with the use of this information. As W. R. MEADOWS, INC. has no control over the use to which others may put its product, it is recommended that the products be tested to determine if suitable for specific application and/or our information is valid in a particular circumstance. Responsibility remains with the architect or engineer, contractor and owner for the design, application and proper installation of each product. Specifier and user shall determine the suitability of products for specific application and assume all responsibilities in connection therewith.

PRODUCT DATA SHEET

Sikaflex®-1c SL

HIGH PERFORMANCE, SELF-LEVELING, ONE-PART POLYURETHANE SEALANT

PRODUCT DESCRIPTION

Sikaflex®-1c SL is a single component, self-leveling, premium-grade polyurethane sealant with an accelerated curing capacity. Meets Federal Specification TT-S-00230C, Type I, Class A. Meets ASTM C-920, Type S, Grade P, Class 25, use T, M, A, G, I.

USES

Sikaflex®-1c SL is used to seal horizontal expansion joints in concrete and cementitious slabs such as:

- Sidewalks
- Balconies
- Pavements
- Terraces
- Warehouses
- Factories
- Civil Structures
- Plazas
- Pitch Pans
- Canals and Water Treatment

CHARACTERISTICS / ADVANTAGES

- 1-component, no mixing
- Self-leveling, pourable
- Accelerated curing
- Can be applied to green concrete 24 hours after pour
- Can be applied to damp concrete 1 hour after getting wet
- Extremely elastic
- High durability
- Resists aging, weathering
- Excellent adhesion
- Convenient, easy-to-use packaging
- Jet fuel resistant
- Water Immersion Applications

PRODUCT INFORMATION

Packaging	10.1 fl. oz. moisture-proof composite cartridges, 24/case. 29 oz. moisture-proof composite cartridges, 12/case. 5 gallon pails. (filled to 5 gal.) 50 gallon drums.
Color	Limestone
Shelf Life	10.1 oz. & 29 oz. cartridge: 1 year in original unopened packaging. 5 gallon pail & 50 gallon drum: 6 months in original unopened packaging.
Storage Conditions	Store at 40–95 °F (4–35 °C). Condition material to 65–75 °F before using.

TECHNICAL INFORMATION

Shore A Hardness	40 ± 5	(21 days at 73 °F (23 °C) and 50 % R.H.) (ASTM D-2240)												
Tensile Strength	150 psi	(21 days at 73 °F (23 °C) and 50 % R.H.) (ASTM D-412)												
Tensile stress at specified elongation	110 psi at 100 %	(21 days at 73 °F (23 °C) and 50 % R.H.) (ASTM D-412)												
Elastic Recovery	>90 %	(73 °F (23 °C) and 50 % R.H.) (ASTM C-719)												
Elongation at Break	320 %	(21 days at 73 °F (23 °C) and 50 % R.H.) (ASTM D-412)												
Adhesion in peel	<table> <tr> <th>Substrate</th><th>Peel Strength</th><th>Adhesion loss</th></tr> <tr> <td>Concrete</td><td>> 28 lbs.</td><td>0 %</td></tr> <tr> <td>Aluminum</td><td>> 30 lbs.</td><td>0 %</td></tr> <tr> <td>Glass</td><td>> 37 lbs.</td><td>0 %</td></tr> </table>	Substrate	Peel Strength	Adhesion loss	Concrete	> 28 lbs.	0 %	Aluminum	> 30 lbs.	0 %	Glass	> 37 lbs.	0 %	(73 °F (23 °C) and 50 % R.H.) (ASTM C-794)
Substrate	Peel Strength	Adhesion loss												
Concrete	> 28 lbs.	0 %												
Aluminum	> 30 lbs.	0 %												
Glass	> 37 lbs.	0 %												
Movement Capability	±25 %	(73 °F (23 °C) and 50 % R.H.) (ASTM C-719)												
Resistance to Weathering	Excellent													
Service Temperature	-40 °F (-40 °C) to 170 °F (77 °C)													

APPLICATION INFORMATION

Coverage

10.1 oz Cartridge: Yield in Linear feet

Width/Depth	1/4"	3/8"	1/2"
1/4"	24.3		
3/8"	16.2	10.8	
1/2"	12.1	8.1	6.1
3/4"	8.1	5.4	4.0
1"			3.0
1.25"			2.4
1.5"			2.0

29 oz Cartridge: Yield in Linear feet

Width/Depth	1/4"	3/8"	1/2"
1/4"	69.8		
3/8"	46.5	31.0	
1/2"	34.9	23.3	17.4
3/4"	23.3	15.5	11.6
1"			8.7
1.25"			7.0
1.5"			5.8

1 gallon: Yield in Linear feet

Width/Depth	1/4"	3/8"	1/2"
1/4"	307.9		
3/8"	205.3	136.8	
1/2"	153.9	102.6	77.0
3/4"	102.6	68.4	51.3
1"			38.5
1.25"			30.8
1.5"			25.7

Ambient Air Temperature

40–100 °F. Sealant should be installed when joint is at mid-range of its

Product Data Sheet

Sikaflex®-1c SL

March 2021, Version 01.07

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BUILDING TRUST



	anticipated movement.	
Substrate Temperature	40–100 °F. Sealant should be installed when joint is at mid-range of its anticipated movement.	
Curing Rate	Tack-free Time: 1 to 2 hours Final Cure: 3 to 5 days	(73 °F (23 °C) and 50% R.H.) (ASTM C 679)

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

LIMITATIONS

- Primer is required if sealant will be subjected to total water immersion.
- Allow 1 week cure at standard conditions when using Sikaflex®-1c SL in total water immersion situations.
- When overcoating with water, oil and rubber-based paints, compatibility and adhesion testing is essential.
- Rigid paints, coatings, or primers will crack over elastomeric sealant experiencing expansion or contraction.
- Maximum exposure level of chlorine is 5 ppm.
- In joints subject to movement - maximum depth of sealant must not exceed 1/2 in.; minimum depth is 1/4 in.
- Minimum depth of sealant for horizontal joints subject to traffic is 1/2 in.
- Maximum expansion and contraction should not exceed 25 % of average joint width.
- Do not cure in the presence of curing silicone sealants.
- Avoid contact with alcohol and other solvent cleaners during cure.
- Do not apply when moisture-vapor transmission condition exists from the substrate as this can cause bubbling within the sealant.
- Use opened cartridges the same day.
- The ultimate performance of Sikaflex®-1c SL depends on good joint design and proper application with joint surfaces properly prepared.
- Do not use in contact with bituminous/asphaltic materials.
- In green concrete applications sealing joints in poor or low strength concrete 24 hours after pour may impact ability of sealant to gain proper adhesion.
- In damp concrete applications all standing water and excess water must be eliminated prior to the 60 minute waiting time.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must

read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

APPLICATION INSTRUCTIONS

SUBSTRATE PREPARATION

Clean all surfaces. Joint walls must be sound, clean, dry, frost-free, and free of oil and grease. Curing compound residues and any other foreign matter must be thoroughly removed. A mechanically roughened surface will also enhance bond. Sikaflex®-1c SL can be applied in green concrete after the concrete has cured for a minimum of 24 hours at 75°F. (23°C). For green concrete applications in control joints the concrete must be cut 8 hours (min.) prior to sealant installation and in expansion joint the forms must be removed 6 hours (min.) prior to sealant installation. For wet concrete applications all excess or standing water must be displaced and concrete must then dry for a minimum of 60 min prior to sealant installation. Install bond breaker tape or backer rod to prevent bond at base of joint. If sealant will be used in immersion service then priming is required - when using primer, green and damp concrete conditions should be avoided.

APPLICATION METHOD / TOOLS

Recommended application temperatures: 40–100 °F. Preconditioning sealant to approximately 70 °F is necessary when working at extremes. For best performance, Sikaflex®-1c SL should be poured into joint when joint slot is at mid-point of its designed expansion and contraction. Pour sealant into joint slot in one direction and allow sealant to flow and level out as necessary. Tool as required, although minimum tooling is necessary. Joint dimension should allow for 1/4 inch minimum and 1/2 inch maximum thickness for sealant. Proper design is 2:1 width to depth ratio. Always use bond breaker tape or closed cell backer rod for support on horizontal joints. Sikaflex®-1c SL can be applied in green concrete after the concrete has cured for a minimum of 24 hours at 75 °F. Control joints must be cut and open for min of 8 hours prior to application. Expansion joints must have forms removed a minimum of 4 hours prior to application. For damp concrete applications Sikaflex-1c SL can be applied 60 minutes after any and all water has been displaced.

Product Data Sheet

Sikaflex®-1c SL

March 2021, Version 01.07

020515010000000015

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs.

NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

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Carretera Libre Celaya Km. 8.5
Fracc. Industrial Balvanera
Corregidora, Queretaro
C.P. 76920
Phone: 52 442 2385800
Fax: 52 442 2250537



Product Data Sheet
Sikaflex®-1c SL
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Sikaflex-1cSL-en-US-(03-2021)-1-7.pdf





The world's **best-selling** electric floor heating brand™

WSMM Snow Melting Mats

SPECIFICATION SHEET WSC-0729

PRODUCT CODES

WSMM-240/6000 // WSMM-Voltage/Wattage

PRODUCT DESCRIPTION

The WSMM (Warmup Snow Melting Mat) is commonly used in concrete pours, asphalt driveways and paved walkways. All Warmup Mats are rated for 208-240 applications. Mats are 2ft or 3ft wide and with a cable spacing providing 50w/sqft for optimum results under even the harshest conditions. Embedded up to 4" deep, they can be laid out as tire-tracks or for full coverage designs.

ADVANTAGES

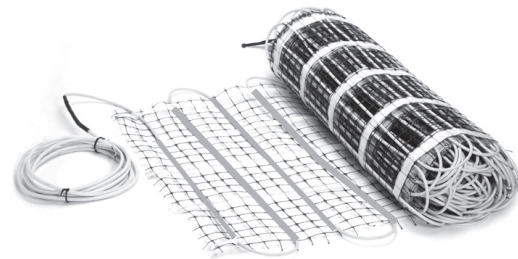
- 16ft cold lead, single point connection
- Easy roll-out installation
- In sand, gravel or on wire mesh

LIMITATIONS

- Do not cut the cable or apply the cable with staples. Apply caution to avoid nailing through the cable and avoid installation under permanent fixtures.

SPECIFICATIONS

Operating voltage	240V & 480V
Output rating	± 50 W/sq ft
Mat width	2ft or 3ft wide
Lengths	Range from 5' (152cm) up to 60' (1828.8cm)
Construction	Energy efficient twin-conductor heating cable of 1/4" (6mm)
Maximum temperature threshold	464°F (240°C)
Cold tail length	16.4' (610cm)



WARMUP INC.
USA: us@warmup.com
Tel.: 1-888-927-6333
www.warmup.com

CANADA: ca@warmup.com
Tel.: 1-888-592-7687
www.warmup.ca



The world's **best-selling** electric floor heating brand™

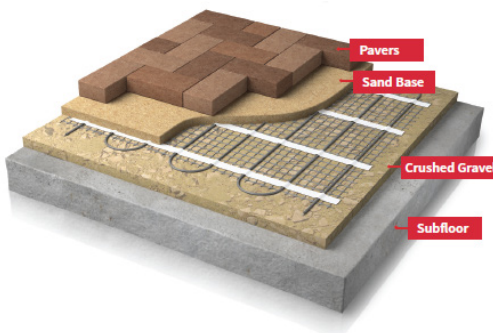
TECHNICAL DATA

Applications

Suitable Coverings	Pavers and related masonry
	Asphalt (direct contact or indirect contact)
	Concrete (not lightweight)
Suitable Base	Crushed gravel base
	Sand bed
	Insulation sheets
Min. coverage	2"
Max. coverage	4"

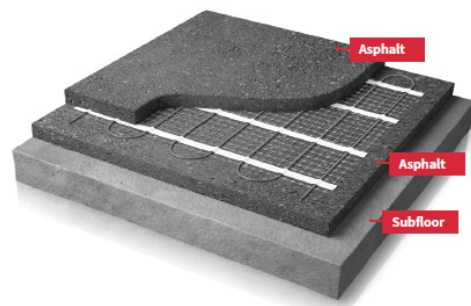
Installation under PAVERS

Mats should be covered with 2" of sand for paver application. Pavers to be maximum 4" thick.



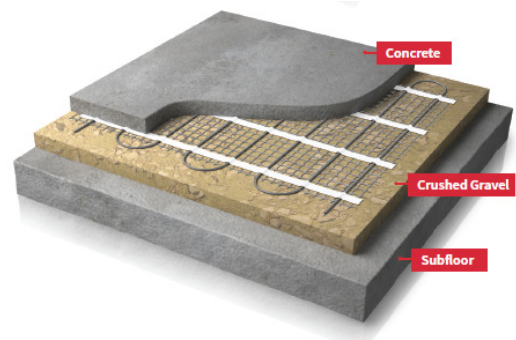
Installation under ASPHALT

Cable will withstand direct asphalt contact for limited time until asphalt cools. For pours hotter than 220F, apply a layer of 2" of sand over the cable prior to laying asphalt. Do not use rollers over 2 Ton. Hand-rolling highly recommended.



Installation under CONCRETE

Ensure the pour is 4" maximum over the cable. Use re-mesh or wire mesh to secure the cable in the middle of the pour for deeper pours. Cable/Mats can be zip tied to mesh and mesh can be raised with bricks or pulled during pour.





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WSMM Snow Melting Mats

SPECIFICATION SHEET WSC-0729

PRODUCT SIZE LISTING

Voltage	Area (sqft)	Code (2ft wide)	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
240V	10	WSMM-240/500	5	500	2.1	115.20
	20	WSMM-240/1000	10	1000	4.2	57.60
	30	WSMM-240/1500	15	1500	6.3	38.40
	40	WSMM-240/2000	20	2000	8.3	28.80
	50	WSMM-240/2500	25	2500	10.4	23.00
	60	WSMM-240/3000	30	3000	12.5	19.20
	70	WSMM-240/3500	35	3500	14.6	16.46
	80	WSMM-240/4000	40	4000	16.7	14.40
	90	WSMM-240/4500	45	4500	18.8	12.80
	100	WSMM-240/5000	50	5000	20.8	11.50
	120	WSMM-240/6000	60	6000	25.0	9.60

Voltage	Area (sqft)	Code (3ft wide)	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
240V	30	WSMM-240/3x10	10	1500	6.3	19.20
	60	WSMM-240/3x20	20	3000	12.5	16.46
	75	WSMM-240/3x25	25	3750	15.6	15.38
	90	WSMM-240/3x30	30	4500	18.8	14.40
	120	WSMM-240/3x40	40	6000	25.0	12.80

Voltage	Area (sqft)	Code (2ft wide)	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
480V	30	WSMM-480/1500	15	1500	3.12	153.84
	40	WSMM-480/2000	20	2000	4.16	115.38
	60	WSMM-480/3000	30	3000	6.25	76.8
	80	WSMM-480/4000	40	4000	8.33	57.62
	120	WSMM-480/6000	60	6000	12.50	38.40

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WSMM Snow Melting Mats

SPECIFICATION SHEET WSC-0729

WARRANTY & MAINTENANCE

When installed according to the installation manual and proper testing has been performed throughout, the system requires no maintenance for the duration of its warranted life.

The WSMM cable is warranted for 10 years against manufacturer's defects and is protected by Warmup's SAFETYnet guarantee. See www.warmup.com for full warranty details.

TECHNICAL SUPPORT

Warmup is available 24/7/365 at (888) 927-6333.

For quotes, layouts and specific technical information, contact us at:

Warmup USA

1+ (888) 927-6333

ussales@warmup.com

Warmup CANADA

1+ (888) 927-6333

ca@warmup.com

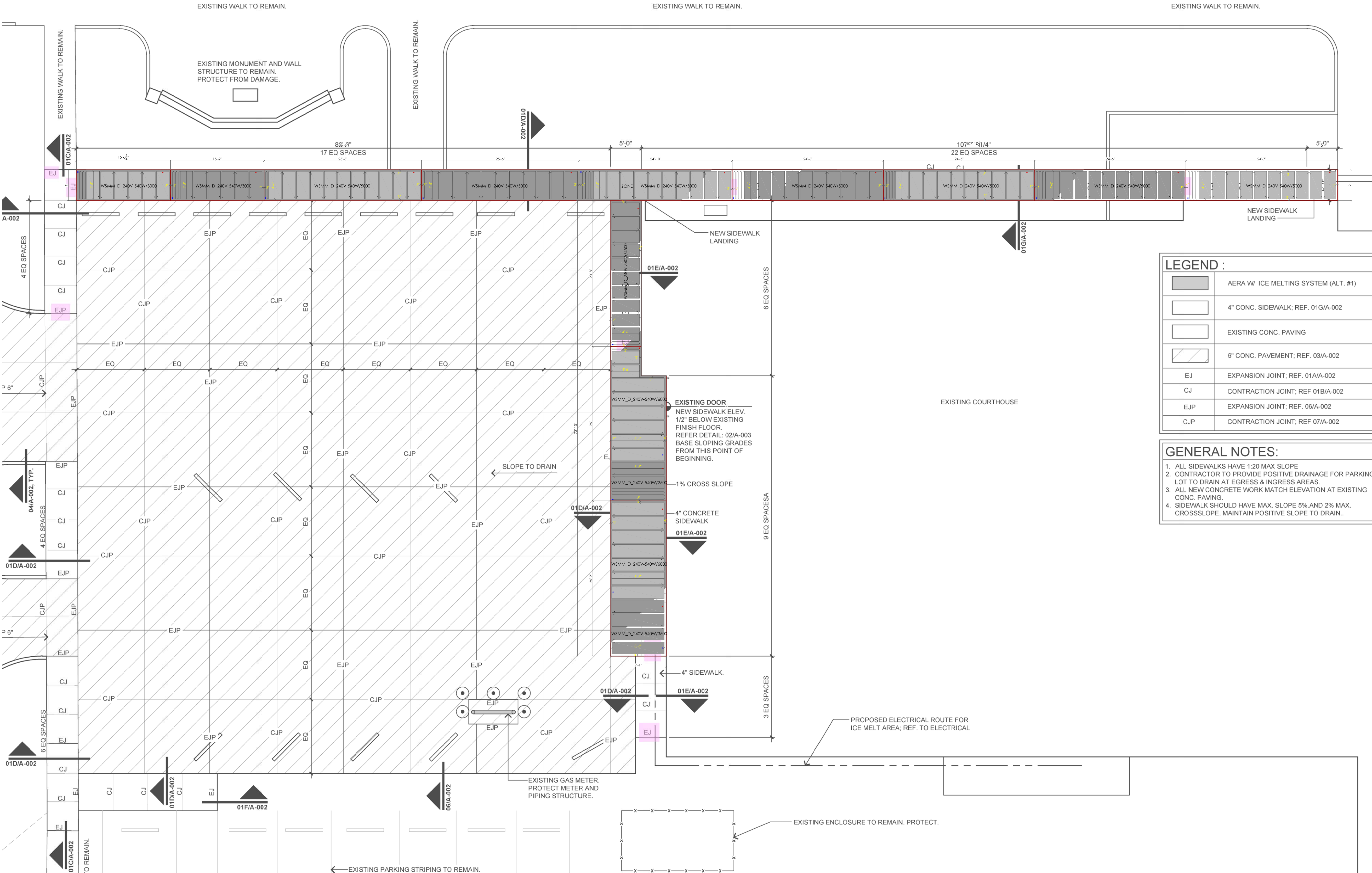
RELATED PRODUCTS

- WSM-252W - see WSC-0115
- Commbox-600 - see WSC-0927
- DS series controls - see WSC-0809



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S. No.	Area Name	Heater Sizes	Length (ft)	Voltage (V)	Heater Wattage (W)	Heater Amps (A)	Mat Spacing (Inches)	Qty
1	ZONE	WSMM_D_240V-540W/6000	120	240	6000	25.0	3	2
2	ZONE	WSMM_D_240V-540W/5000	100	240	5000	20.8	3	7
3	ZONE	WSMM_D_240V-540W/4500	90	240	4500	18.8	3	1
4	ZONE	WSMM_D_240V-540W/3500	70	240	3500	14.6	3	1
5	ZONE	WSMM_D_240V-540W/3000	60	240	3000	12.5	3	2
6	ZONE	WSMM_D_240V-540W/2500	50	240	2500	10.4	3	1
	Total					264.4		14



LEGEND :	
	AERA W/ ICE MELTING SYSTEM (ALT. #1)
	4" CONC. SIDEWALK; REF. 01G/A-002
	EXISTING CONC. PAVING
	8" CONC. PAVEMENT; REF. 03/A-002
EJ	EXPANSION JOINT; REF. 01A/A-002
CJ	CONTRACTION JOINT; REF 01B/A-002
EJP	EXPANSION JOINT; REF. 06/A-002
CJP	CONTRACTION JOINT; REF 07/A-002

GENERAL NOTES:	
1. ALL SIDEWALKS HAVE 1:20 MAX SLOPE	
2. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE FOR PARKING LOT TO DRAIN AT EGRESS & INGRESS AREAS	
3. ALL NEW CONCRETE WORK MATCH ELEVATION AT EXISTING CONC. PAVING.	
4. SIDEWALK SHOULD HAVE MAX. SLOPE 5% AND 2% MAX. CROSSSLOPE, MAINTAIN POSITIVE SLOPE TO DRAIN..	

Copyright: The copyright in this drawing belongs exclusively to Warmup plc and its use is governed by the terms and conditions of contract between Warmup plc and its client. This drawing may only be used by the client for the project at the location specified. It may not be copied, reproduced in any way in whole or in part or disclosed to any other third party.

Disclaimers: *The purpose of this drawing is for guidance only, field adjustments may be necessary.* This drawing must be read in conjunction with all other relevant drawings and Warmup product specifications and operating manuals. The Product drawings shown are not to be used for construction purposes. Full details of product dimensions and installation requirements are contained within Warmup's product manuals. The drawings are based on information and data supplied by the client. The client is solely responsible for ensuring that site-specific changes and dimensions are brought to Warmup's attention. Any use made of this drawing by any third party is entirely at the risk of such third parties. No responsibility will be accepted for any alteration and/or deviation from this design. All work on site to be carried out to the entire satisfaction of the local authority building control department and any other relevant statutory body notwithstanding anything shown or indicated on this drawing.

The customer is responsible for notifying and providing warmup with exact locations of any expansion or control joints (if applicable) before purchasing. Crossing expansion or control joints with the heating cable should be avoided, however, if this is not possible contact your warmup quoting specialist for installation recommendations and requirements.

Design Layout Legend

start of lead connection

suggested Control Location

Relay

loose laid cable
(heating elements that has been removed from matting)

directional arrows

WARMUP Notes & Materials

The world's **best-selling** floor heating brand™

Tel (888) 927-6333
www.warmup.com

PROJECT:		KING FISHER PARKING SITE L-WSMM-240	
TITLE:			
SCALE:	1/8"=1'-0" _ D	DATE:	25.05.2023
DESIGNER:	AT	NUM:	01
PROJECT MANAGER:			

Date: February 23, 2024

Reference: Kingfisher County Courthouse Sourcewell Contract #092222-GNR

We are pleased to offer the following quote for the above project:

Quantity 1 - Generac Industrial gaseous engine-driven generator, turbocharged/aftercooled 12 cylinder 25.8L engine, consisting of the following features and accessories:

- Stationary Emergency-Standby rated
- Natural Gas fuel system
- 500kW Rating, wired for 120/240 VAC three phase, 60 Hz
- Permanent Magnet Excitation
- UL2200
- EPA Non Emergency Certified
- Level 1 Acoustic Enclosure, Steel
 - Industrial Grey Baked-On Powder Coat Finish
- Power Zone Digital Control Panel for Single or MPS Generators
 - Meets NFPA 99 and 110 requirements
 - Temp Range -40 to 70 degrees C
 - Humidity 2 – 95% (Non Condensing)
 - UL6200
 - C-ETL-US
 - CE
 - FCC
 - IEC801 (Radiated Emissions, Susceptibility, and Surge Immunity)
 - 7" Resistive Color Touchscreen
 - Built-in Webserver
 - IP65 (front)
 - Auto/Manual/Off key switch, Alarm Indication, Not in Auto Indication, audible alarm, emergency stop switch
 - Dual Core Digital Microprocessor
 - RS485, Ethernet and CANbus ports
 - Engine Sensors: Oil Pressure, optional Oil Temp, Coolant Temp and Level, Fuel Level/Pressure (where applicable), Engine Speed, DC Battery Voltage, Run-time Hours, Generator Voltages, Amps, Frequency, Power, Power Factor
 - Alarm Status: Low or High AC Voltage, Low or High Battery Voltage, Low or High Frequency, Pre-low or Low Oil Pressure, Pre-high or High Oil Temp (optional), Low Water Level and Temp, Pre-high or High Engine Temp, High, Low, and Critical-low Fuel Level/Pressure (where applicable), Overcrank, Over and Under Speed, Unit Not in Automatic
 - Programmable I/O
 - Built-in PLC for special applications
 - Engine function monitoring and control:
 - Full range standby operation; programmable auto crank, Emergency Stop, Auto-Off-Manual switch
 - Isochronous Governor
 - 0.25% digital frequency regulation with: soft-start ramping - adjustable, gain - adjustable, overshoot limit - adjustable
 - 3 Phase RMS Voltage Sensing

- +/-0.5% digital voltage regulation with: soft-start voltage ramping - adjustable, loss of sensing protection - adjustable, negative power limit - adjustable, Hi/Lo voltage limit - adjustable, V/F slope and gain - adjustable, fault protection
 - Service reminders, trending, fault history (alarm log)
 - I2T function for full generator protection
 - Selectable low-speed exercise
 - 2 and 3-wire start controls for any industrial grade transfer switch
- MLCB, LSI Electronic Trip, 80% Rated
 - 1600 Amp
- Battery Heating Pads
- Battery Charger, 10 Amp, NFPA 110 compliant, installed
- 225 AH, 1155 CCA Group 8D Batteries, with rack, installed
- Block Heater, 2400W 240V
- 100DB Alarm Horn
- Alternator Strip Heater
- Engine Run Relay
- Flex Fuel Line
- Flush Mount Annunciator Kit
- Ground Fault Annunciator
- Oil Temp Sender
- 21 Light Remote Annunciator, Surface Mount
- Remote Emergency Stop Switch, Surface-Mount, shipped loose
- Std set of 3 Manuals
- Ground Fault
- 5-Year Comprehensive Warranty
- SG0500JG30258N18PPSYG

Quantity 1 - 25.8, 33.9 GAS 5C 5 YR P/L/T

Quantity 1 - Freight - Common Carrier - ATS

Quantity 1 - Startup

Quantity 1 - Freight - Flat Bed

Quantity 1 - ASCO 300 Series G03AUSA31600FGXM,11BE,44G :

- 300 Series, Automatic Service Entrance Transfer Switch,3 Pole with Solid neutral, 240V, 1600A, Type 3R Secure Enclosure

Total investment for the above equipment (Not including any applicable tax or freight): **\$237,313.30**

Notes

Estimated Delivery: 40-46 Weeks

Prices valid for 90 days from above date

FOB: Jobsite

Terms and Conditions

Net 30 days, subject to review and approval by our Credit Dept. Payment obligations are not dependent or contingent upon the manner in which purchaser may receive payment from others. No retainage against this order will be permitted unless agreed to ahead of time. Warranty is invalid without factory start up. Start up will be done during normal business hours. Additional charges will be applied to start ups requested on weekends or off normal business hours.

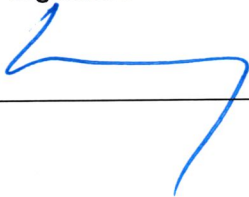
Sincerely,

Rocky Hollingsworth
New Equipment Sales Representative
Clifford Power Systems
4055434621
rhollingsworth@cliffordpower.com

Acceptance of Quote

Prior to ordering equipment or services, please sign and return as a confirmation of the above terms and conditions.

Customer Signature



2-26-24

GENERAL NOTES	
1.	ALL ELECTRICAL WORK SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) & THE AMERICANS WITH DISABILITIES ACT (ADA).
2.	REFER TO MECHANICAL AND CIVIL DRAWINGS FOR RELATED INFORMATION.
3.	REFER TO THE SPECIFICATIONS FOR DATA NOT ON THE DRAWINGS.
4.	COORDINATE OUTLET BOX LOCATIONS WITH MASONRY TO MINIMIZE CUTTING OF BRICK OR BLOCK.
5.	ALL MOUNTING HEIGHTS TO CENTERLINE OF ITEM UNLESS OTHERWISE NOTED. VERIFY ALL OUTLET LOCATIONS ON THE JOB PRIOR TO ROUGH-IN.
	CONDUIT RUN W/CONDUCTORS AS INDICATED & GROUND WIRE SIZED PER N.E.C. 250.122. CONDUIT SIZE AS REQUIRED.
7.	WHEN INCREASED CONDUCTOR SIZES ARE SHOWN ON THE PLANS, THE LARGER CONDUCTOR SIZE SHALL BE USED THROUGHOUT THE LENGTH OF THE CIRCUIT, INCLUDING NEUTRAL AND GROUND.

PANELBOARD: L1										220/240 VOLTS, 1 PHASE, 3 WIRE 225 AMP M.L.O. SURFACE MTD. 65000 AIC LABELED			
W/GRD. BUS													
CIRC NO.	LOAD V.A.	LOAD TYPE	LOAD DESCRIPTION	P	AMP SIZE	AMP SIZE P	LOAD DESCRIPTION	LOAD TYPE	LOAD V.A.	LOAD NO.			
5/1	1		BASEMENT LIGHTS	20	A	20 1	UNKNOWN			2			
5/1	3		BASEMENT LIGHTS	20	B	20 1	UNKNOWN			4			
5/1	5		BASEMENT LIGHTS	20	A	20 1	UNKNOWN			6			
5/1	7		BASEMENT LIGHTS	20	B	20 1	UNKNOWN			8			
5/1	9		BASEMENT REC.	20	A	20 1	UNKNOWN			10			
5/1	11		UNKNOWN	30	B	20 1	UNKNOWN			12			
5/1	13		BASEMENT LIGHTS	20	A	20 1	UNKNOWN			14			
5/1	15		BASEMENT LIGHTS	20	B	20 1	UNKNOWN			16			
5/1	17		EMERGENCY LIGHTS	20	A	20 1	UNKNOWN			18			
5/1	19		EMERGENCY LIGHTS	20	B	20 1	UNKNOWN			20			
5/1	21		BASEMENT REC.	20	A	20 1	UNKNOWN			22			
5/1	23		BASEMENT REC.	20	B	20 2	GEN JACKET HEATER	POWER	3000	24			
5/1	25		BASEMENT REC.	20	A	1	-----		---	26			
5/1	27		BASEMENT EMERGENCY LIGHTS	20	B	20 1	GEN OIL PUMP HEATER	POWER	800	28			
4	29		BASEMENT REC. ENTRY WEST	20	A	20 1	GEN BATTERY CHARGER	POWER	1200	30			
4	31		BASEMENT REC. ENTRY WEST	20	B	25 1	GEN ENCLOSURE HEATER	POWER	2000	32			
5/2	33		CIRCLE WATER PUMP	20	A	20 1	LIGHT & RECEPT AT GENERATOR	R/L	260	34			
5/2	35		UNKNOWN	20	B	20 1	SPARE			36			
5/2	37		UNKNOWN	20	A	20 1	SPARE			38			
5/2	39		UNKNOWN	20	B	20 1	SPARE			40			
5/2	41		UNKNOWN	20	A	20 1	SPARE			42			
43			SPARE	1	20	B	20 1	SPARE		44			
45			SPARE	1	20	A	20 1	SPARE		46			
47			SPARE	1	20	B	20 1	SPARE		48			
49			SPARE	1	20	A	20 1	SPARE		50			
51			SPARE	1	20	B	20 1	SPARE		52			
53			SPARE	1	20	A	20 1	SPARE		54			
55			SPARE	1	20	B	20 1	SPARE		56			
57			SPARE	1	20	A	20 1	SPARE		58			
59			SPARE	1	20	B	20 1	SPARE		60			

- ① CIRCUIT BREAKER PROVIDED FOR CONNECTION TO EXISTING LOAD WITHIN SWITCHBOARD MOUNTED PANEL.
- ② CIRCUIT BREAKER PROVIDED FOR CONNECTION TO EXISTING LOAD WITHIN WALL MOUNTED PANEL.
- ③ CONTRACTOR TO VERIFY ALL EXISTING LOADS BEING REFEED. UPDATE PANEL DIRECTORY BASED ON THE LOADS THEY SERVE WITHIN THE FACILITY.
- ④ CIRCUIT BREAKER PROVIDED FOR CONNECTION TO EXISTING LOAD WITHIN SWITCHBOARD MOUNTED CIRCUIT BREAKERS. REFERENCE FLOOR PLAN AND KEYED NOTE D9. EXTEND CIRCUIT AS REQUIRED AND CONNECT TO NEW CIRCUIT BREAKER. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING.
- ⑤ REFERENCE FLOOR PLAN AND KEYED NOTE D8. EXTEND CIRCUIT AS REQUIRED AND CONNECT TO NEW CIRCUIT BREAKER. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING.
- ⑥ CIRCUIT BREAKER PROVIDED FOR CONNECTION TO EXISTING LOAD WITHIN PANEL 'PB-1.'
- ⑦ SINGLE SECTION PANELBOARD.

SYMBOL LIST					
SYMBOL	DESCRIPTION	MOUNTING	SYMBOL	DESCRIPTION	MOUNTING
ABBREVIATIONS					
NL	NIGHT LIGHT - WIRE AHEAD OF CONTROLS		AFF	ABOVE FINISHED FLOOR	
EM	ON EMERGENCY POWER		AFG	ABOVE FINISHED GRADE	
WP	WEATHERPROOF		DF	DRINKING FOUNTAIN - SEE GENERAL NOTE 11	
CT	COUNTERTOP (SEE GEN. NOTE 9)		GAP	GENERATOR ANNUNCIATOR PANEL	
UON	UNLESS OTHERWISE NOTED				
W	WALL				
CONDUIT AND WIRING					
	EMERGENCY CIRCUIT	CLG/WALL		CONDUIT HOME RUN, 1 CIRCUIT. 2#12 & 1#12 GRD. - 1/2".	CLG/WALL
	MASTER/SLAVE FIXTURE WHIP LOW VOLTAGE WIRING	CEILING CLG/WALL		CONDUIT HOME RUN, 2 CIRCUITS. 4#12 & 1#12 GRD. - 1/2".	CLG/WALL
	CDT RUN 2#12 & 1#12 GRD. - 1/2". OR CDT RUN AS NOTED ON PLAN	CLG/WALL		CONDUIT HOME RUN, 3 CIRCUITS. 6#12 & 1#12 GRD. - 1/2".	CLG/WALL
	CDT RUN 2#12 & 1#12 GRD. - 3/4". OR CDT RUN AS NOTED ON PLAN	EARTH/ FLOOR		CONDUIT HOME RUN, 2 CIRCUITS PHASE CONDUCTORS/ NEUTRAL CONDUCTOR (#12 UON) SWITCH LEGS (#12 UON) GROUND CONDUCTOR (#12 UON)	CLG/WALL
	CONDUIT HOME RUN, 1 CIRCUIT. 2#10 & 1#10 GRD. (GEN. NOTES 7 & 8)	CLG/WALL			
	CONDUIT RUN PARTIAL CIRCUIT. 2#12 & 1#12 GRD. - 1/2".	CLG/WALL			
	MISC. EQUIPMENT CONNECTION				
	CONDUIT SEAL OFF				
POWER					
	SINGLE GROUNDED RECEPTACLE	18" AFF		BRANCH CIRCUIT PANEL AND PANEL DESIGNATION	72" TO TOP
	DUPLEX GROUNDED RECEPTACLE	18" AFF		ELECTRICAL DISTRIBUTION EQUIP	
	DUPLEX GROUNDED RECEPTACLE CEILING			EQUIPMENT - SEE EQUIPMENT CONNECTION SCHEDULE	
	DOUBLE DUPLEX GROUNDED REC	18" AFF		CONDUIT SLEEVE (GEN NOTE 13)	
	GROUND FAULT DUPLEX REC	18" AFF		CABLE TRAY (GEN NOTE 14)	
	GFD FAULT DOUBLE DUPLEX REC	18" AFF		MOTOR	
	DUPLEX GRD REC BOTTOM SWITCH	18" AFF		DISCONNECT SWITCH	
	TAMPER-PROOF DUPLEX REC	18" AFF		MANUAL STARTER	
	TAMPER-PROOF GFCI DUPLEX REC	18" AFF		CIRCUIT BREAKER	
				STARTER OR ATS (AS NOTED)	
				COMBINATION STARTER/DISC RELAY	
	SPECIAL OUTLET (SEE SCHEDULE OR AS NOTED)	FLOOR/WALL		PUSHBUTTON (1-BUTTON, 2-BUTTON BOX MOUNTED TRANSFORMER)	46" AFF
	SPECIAL DEVICE (AS NOTED)			CONTACTOR	
	FEEDER DESIGNATION			METER	
	JUNCTION BOX - 1-GANG			PLUGMOLD SURFACE RACEWAY	WALL
	JUNCTION BOX - 2-GANG			BUSDUCT PLUG	
	FUSTAT BUSS #SSY	46" AFF			
	THERMOSTAT/TEMP SENSOR	46" AFF			
	PLUG LOAD SENSOR	CEILING			
	HANDICAP DOOR PUSHBUTTON	36" AFF			
--- SYMBOL LIST IS FOR REFERENCE ONLY. ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT. ---					

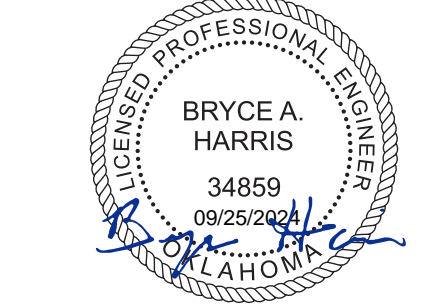
ELECTRICAL SHEET INDEX	
SHEET NO.	SHEET TITLE
E-001	ELECTRICAL GENERAL NOTES AND SYMBOLS
E-111	ELECTRICAL DEMOLITION SITE PLAN
E-112	ELECTRICAL PROPOSED SITE PLAN
E-131	ELECTRICAL BASEMENT DEMOLITION PLAN
E-132	ELECTRICAL BASEMENT PROPOSED PLAN
E-601	ELECTRICAL ONE-LINE DIAGRAMS
E-611	ELECTRICAL DETAILS

SYMBOL LIST					
SYMBOL	DESCRIPTION	MOUNTING	SYMBOL	DESCRIPTION	MOUNTING
LIGHTING, SWITCHES AND SENSORS					
	LIGHT FIXTURE & FIXTURE LETTER	CLG SURF/ RECESSED		SWITCHES (1-POLE, 2-POLE, 3-WAY, 4-WAY)	46" AFF
	STRIP LIGHT FIXTURE & FIXT LETTER	CEILING		SWITCHES (KEYED, PILOT, TIMER)	46" AFF
	LIGHT FIXTURE & FIXTURE LETTER	CLG SURF/ RECESSED		INDICATES SWITCHING SCHEME	46" AFF
	LIGHT FIXTURE & FIXTURE LETTER	WALL		1 RELAY OCCUPANCY SENSOR SW	46" AFF
	EXIT SIGN (SHADING DENOTES EXIT FACE SIDE)	CEIL/WALL		2 RELAY OCCUPANCY SENSOR SW	46" AFF
	LIGHT FIXTURE & FIXTURE LETTER	WALL		1 RELAY OCCUPANCY SENSOR/ DIMMER SWITCH (GEN NOTE 15)	46" AFF
	FIXTURE WITH SHADED LAMP(S) ON EMERGENCY POWER	CLG SURF/ RECESSED		DIMMER SWITCH (GEN NOTE 15)	46" AFF
	EMERGENCY BATTERY LIGHT FIXT	CEIL/WALL		LOW VOLTAGE SWITCH	46" AFF
	COMB EXIT SIGN/EM BATTERY LIGHT	WALL		ON/OFF SWITCH	46" AFF
	LIGHT FIXTURE & FIXTURE LETTER	POLE		ON/OFF/10V DIMMING SWITCH	46" AFF
	LIGHTING TRACK, TRACK FIXTURES, & FIXTURE LETTERS	CEILING		DUAL TECH ON/OFF SENSOR	46" AFF
	PHOTOCELL			16-SCENE WALL CONTROLLER	46" AFF
				DUAL TECH ON/OFF/10V DIM SW	46" AFF
				OCCUPANCY SENSOR	CLG/WALL
				LIGHTING CONTROL POWER PACK	
				UL-924 LISTED POWER PACK	
				AV SYSTEM/LIGHTING INTERFACE	
				DAYLIGHT SENSOR	CEILING
ONE-LINE					
	CIRCUIT BREAKER ACCESSORIES: LSIG = LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT GFI = GROUND FAULT ST = SHUNT TRIP K = KIRK KEY INTERLOCK			FUSIBLE SWITCH (CIRCUIT NUMBER / SWITCH SIZE / FUSE SIZE / # OF POLES) (# OF POLES IF OTHER THAN 3)	
	INDICATOR LIGHT (G=GREEN, R=RED)			STARTER WITH FUSIBLE SWITCH (CIRCUIT NUMBER / SWITCH SIZE / FUSE SIZE / # OF POLES / STARTER SIZE) (# OF POLES IF OTHER THAN 3)	
	CONTACTS (N.O., N.C.)			CIRCUIT BREAKER (MOLDED CASE NON-ADJUSTABLE TRIP / ADJUSTABLE TRIP)	
	FUSE			(CIRCUIT NUMBER / TRIP SIZE / # OF POLES) (FRAME SIZE / TRIP SIZE) (# OF POLES IF OTHER THAN 3)	
	CIRCUIT BREAKER			30 TRANSFORMER (DELTA PRIMARY / WYE SECONDARY)	
	OVERLOADS			10 TRANSFORMER	
	DRAWOUT CONTACTS			PANELBOARD (BUILT-IN SPD)	
	DISCONNECT SWITCH (SEE EQUIP CONN SCHED)			TRANSFER SWITCH (ATS = AUTOMATIC, MTS = MANUAL) (AMP SIZE / VOLTAGE / POLES / AIC RATING / NEMA RATING) (NEMA RATING IF OTHER THAN NEMA-1)	
	(VOLTAGE / SWITCH SIZE / FUSE SIZE / # OF POLES - NOTED IF EQUIPMENT NOT SCHEDULED)			MOTOR STARTER [SINGLE SPEED ACROSS-THE-LINE (UON)] (NEMA SIZE / RV AT= REDUCED VOLTAGE / AUTO-TRANSFORMER / SS = SOLID STATE)	
	STARTER (SEE EQUIP CONN SCHED) (VOLTAGE / STARTER SIZE / # OF POLES - NOTED IF EQUIPMENT NOT SCHEDULED)				
	GROUND CONNECTION				
	LIGHTNING ARRESTOR				
	FEEDER DESIGNATION				
	SURGE PROTECTIVE DEVICE				
	METER (UTILITY / PANEL MOUNTED)				
	EQUIPMENT (SINGLE MOTOR / MULTI-MOTOR OR OTHER TYPE AS NOTED)				
	VARIABLE FREQUENCY DRIVE (HP SIZE IF NOT SCHEDULED)				
PEN WEIGHT LEGEND					
	ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN DARK SOLID LINES ARE NEW TO BE INSTALLED			ALL DEVICES, LIGHT FIXTURES, ETC., DRAWN IN DARK DASHED LINES ARE EXISTING TO BE REMOVED	
	NEW LIGHT FIXTURE			DUPLEX GROUNDED REC TO BE REMOVED	
	EXISTING LIGHT FIXTURE TO REMAIN			LIGHT FIXTURE TO BE REMOVED	
	EXISTING DUPLEX GROUNDED REC TO REMAIN			DUPLEX GROUNDED REC TO BE RELOCATED	
	EXISTING LIGHT FIXTURE TO REMAIN			LIGHT FIXTURE TO BE RELOCATED	
--- SYMBOL LIST IS FOR REFERENCE ONLY. ALL SYMBOLS MAY NOT BE USED ON THIS PROJECT. ---					

(1)(2)(3)(4)		LIGHTING FIXTURE SCHEDULE				(P.E.C. - WICHTA)				
<p>1. GENERAL CONTRACTOR SHALL PROVIDE FIREPROOFING AROUND RECESSED FIXTURES INSTALLED IN FIRE RATED CEILING PER U.L. REQUIREMENTS. ELECTRICAL CONTRACTOR WILL COORDINATE.</p> <p>2. MANUFACTURERS LISTED IN THIS SCHEDULE OR APPROVED BY WRITTEN ADDENDUM WILL BE THE ONLY APPROVED MANUFACTURERS TO BID THE LIGHTING FIXTURES FOR THIS PROJECT. CONTRACTORS AND SUPPLIERS USING PRICING FROM MANUFACTURERS NOT LISTED ON SCHEDULE OR BY ADDENDUM DO SO AT THEIR OWN RSK.</p> <p>3. LIGHT FIXTURE SELECTIONS ARE BASED ON THE MANUFACTURER IN THE LEFT MOST COLUMN AS LISTED IN THE SCHEDULE. FIXTURES APPROVED AS EQUALS IN THIS SCHEDULE OR BY ADDENDUM SHALL BE EQUAL TO THE UNIT SPECIFIED IN THE LEFT MOST COLUMN, IE: SPRING LOADED LATCHES, POST PAINTED FINISH, PHOTOMETRICS.</p> <p>4. ALL LIGHT FIXTURES SHALL BE SECURED TO THE CEILING FRAMING SYSTEM BY MECHANICAL MEANS (SUCH AS BOLTS, SCREWS, OR RIVETS) OR BY CLIPS IDENTIFIED FOR USE WITH THE TYPE OF CEILING FRAMING MEMBER AND LIGHT FIXTURE.</p> <p>5. LIGHT FIXTURES SHALL BE PROVIDED WITH 0-10V DIMMING DRIVERS. DRIVERS SHALL BE CAPABLE OF DIMMING TO A MINIMUM OF 10% TOTAL LIGHT OUTPUT. LED DRIVERS SHALL HAVE A DISCONNECTING MEANS MEETING THE REQUIREMENTS OF NEC SECTION 410.130(G), EXCEPT FOR THOSE INSTALLED IN CORD AND PLUG CONNECTED FIXTURES. WHERE APPLICABLE, WHEN DIMMING SWITCHES ARE NOT PROVIDED AS PART OF THE DESIGN, CONTRACTOR SHALL CAP OFF THE 0-10V DIMMING WIRES FOR FUTURE EXTENSION BY THE OWNER.</p>										
MARK	DESCRIPTION	MANUFACTURER 1 CATALOG NUMBER	LIGHT SOURCE			LENS/LOUVER/FINISH	DIMENSIONS	REF. NOTE	REMARKS	
			#	TYPE	WATTS	VOLTS	W	L	D	
ARG	POLE MOUNT	LUMARK XTOR66-W-BZ-CBP	1	LED	56	UNV	1.1	1.25	0.77	5 5500LM; 4000K; 70CRI. PROVIDE WITH LOW TEMP EMERGENCY BATTERY PACK



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JUNE 30, 2025

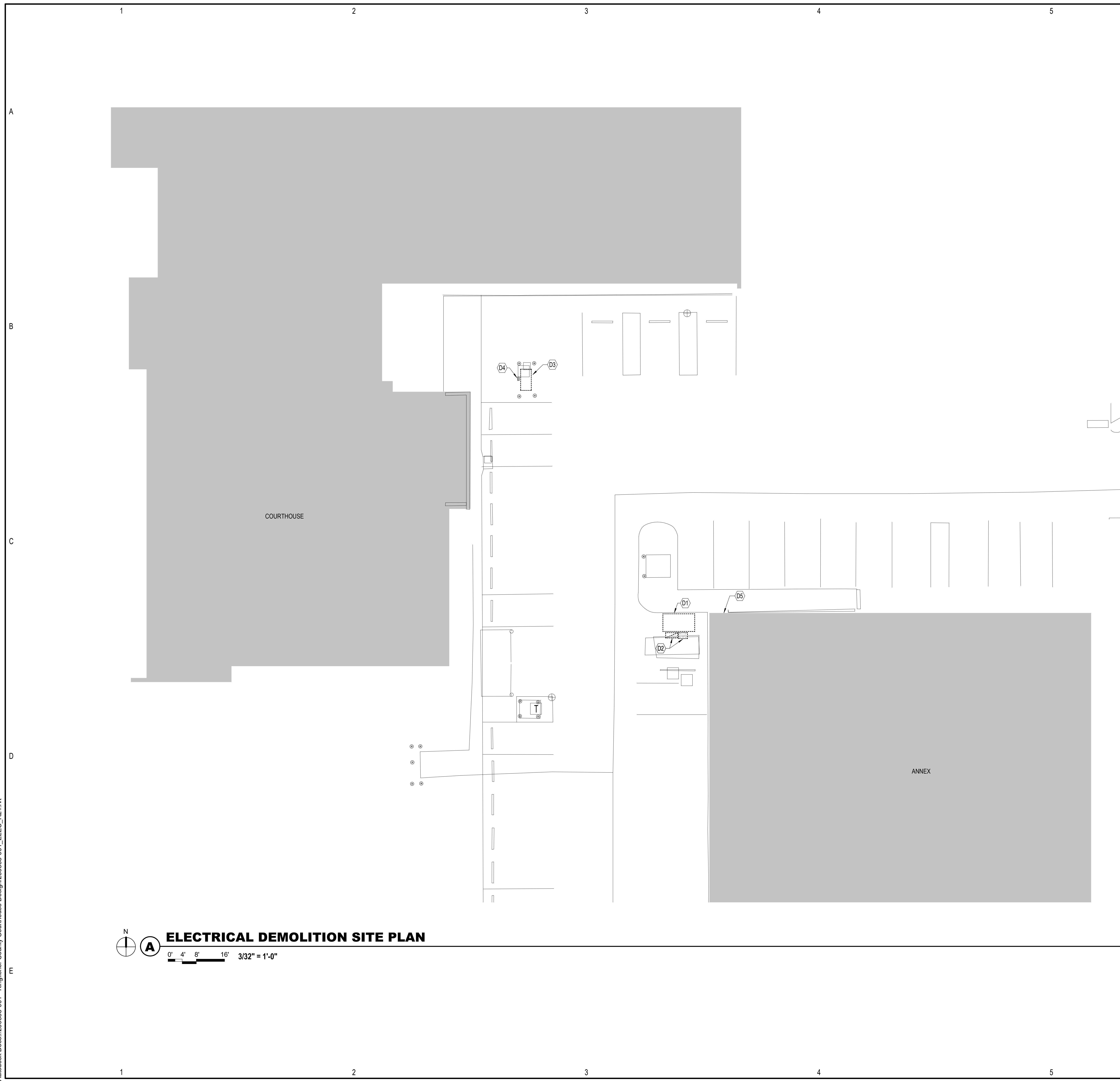


Kingfisher County Courthouse
Electrical Upgrade
101 South Main St
Kingfisher, OK 73750

Issue:		
JOB NO.	230855-001	
DATE	09.26.2024	
PM		
DESIGNED BY	TMD	
DRAWN BY	TJB	
CHECKED BY	RLB	

ELECTRICAL GENERAL NOTES AND SYMBOLS

E-001



ELECTRICAL SITE GENERAL NOTES

1. UNLESS OTHERWISE NOTED, ALL CONDUIT ROUTED ON SITE SHALL BE 1" MINIMUM.
2. ALL RISERS SHALL BE PVC COATED RIGID GALVANIZED STEEL (RGS) ALL ELLS BELOW GRADE SHALL BE PVC COATED RIGID GALVANIZED STEEL (RGS). PROVIDE WITH PVC TO STEEL ADAPTER(S) AS NECESSARY. (THIS REQUIREMENT SHALL NOT APPLY TO FIXTURE POLE BASES).
3. ALL ELECTRICAL WORK AND FEES ASSOCIATED WITH UTILITIES SHALL BE VERIFIED AND COORDINATED WITH LOCAL SERVICE PROVIDER PRIOR TO BID.
4. CONTRACTOR SHALL REFERENCE ALL RELATED CONTRACT DOCUMENTS, SITE SURVEY, AND OTHER RESOURCES FOR POSSIBLE CONFLICTS WITH OTHER UNDERGROUND UTILITIES. AT UTILITY CROSSINGS, CONTRACTOR SHALL VERIFY UTILITY DEPTHS AND COORDINATE CONDUIT ROUTING AS NECESSARY.
5. CONTRACTOR SHALL VERIFY AND COORDINATE EXISTING CONDITIONS OF PROJECT SITE PRIOR TO BID.

KEYNOTES

- | | |
|----|--|
| D1 | LOCATION OF EXISTING GENERATOR IN SOUND ATTENUATED ENCLOSURE SERVING ANNEX BUILDING TO BE REMOVED. COORDINATE REMOVAL OF EQUIPMENT WITH FACILITY. |
| D2 | LOCATION OF EXISTING 800A DISCONNECT SWITCH AND TRANSFER SWITCH MOUNTED ON UNISTRUT STAND SERVING ANNEX BUILDING TO BE REMOVED. COORDINATE REMOVAL OF EQUIPMENT WITH FACILITY. |
| D3 | EXISTING OVERHEAD UTILITY TRANSFORMER, WEATHERHEADS, MET. CONDUITS, AND CONDUCTORS SERVING COURTHOUSE TO BE REMOVED. |
| D4 | EXISTING TELECOMMUNICATIONS PEDISTAL TO REMAIN. |
| D5 | EXISTING COURTHOUSE ANNEX BUILDING IS SCHEDULED TO BE DEMOLISHED OUTSIDE OF THE SCOPE OF THE PROJECT. |

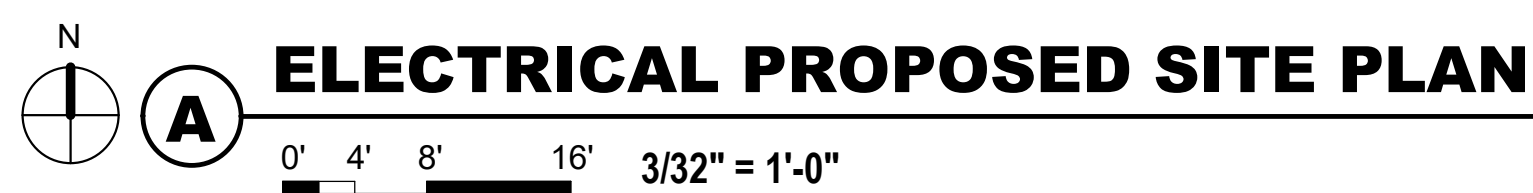


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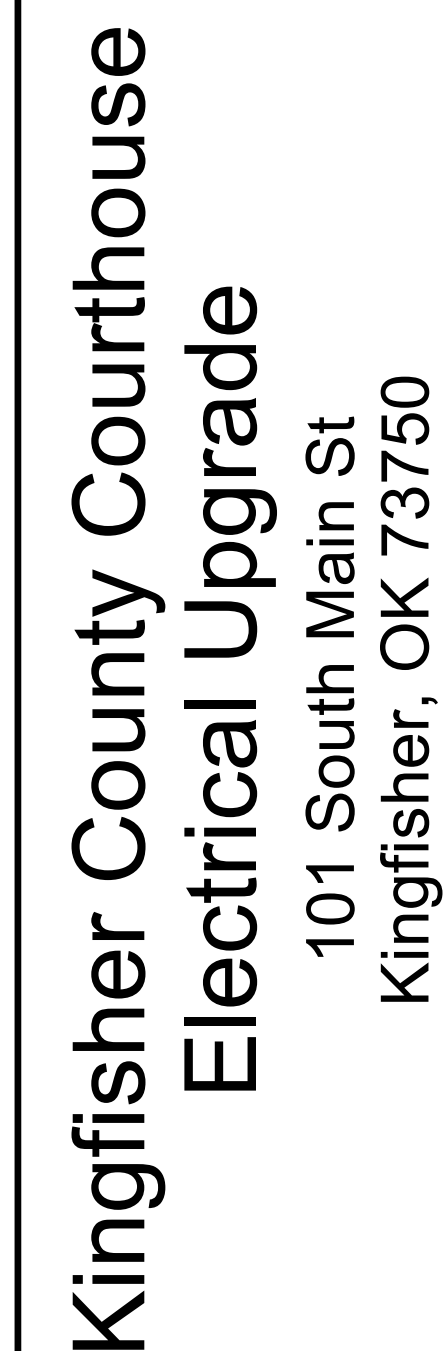
ELECTRICAL DEMOLITION
SITE PLAN

E-111

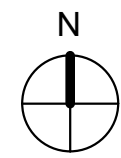


1. UNLESS OTHERWISE NOTED, ALL CONDUIT ROUTED ON SITE SHALL BE 1" MINIMUM.
2. ALL RISERS SHALL BE PVC COATED RIGID GALVANIZED STEEL (RGS) ALL ELLS BELOW GRADE SHALL BE PVC COATED RIGID GALVANIZED STEEL (RGS). PROVIDE WITH PVC TO STEEL ADAPTER(S) AS NECESSARY. (THIS REQUIREMENT SHALL NOT APPLY TO FIXTURE POLE BASES).
3. ALL ELECTRICAL WORK AND FEES ASSOCIATED WITH UTILITIES SHALL BE VERIFIED AND COORDINATED WITH LOCAL SERVICE PROVIDER PRIOR TO BID.
4. CONTRACTOR SHALL REFERENCE ALL RELATED CONTRACT DOCUMENTS, SITE SURVEY, AND OTHER RESOURCES FOR POSSIBLE CONFLICTS WITH OTHER UNDERGROUND UTILITIES. AT UTILITY CROSSINGS, CONTRACTOR SHALL VERIFY UTILITY DEPTHS AND COORDINATE CONDUIT ROUTING AS NECESSARY.
5. CONTRACTOR SHALL VERIFY AND COORDINATE EXISTING CONDITIONS OF PROJECT SITE PRIOR TO BID.

D4 EXISTING TELECOMMUNICATIONS PEDISTAL TO REMAIN.
X1 CONTRACTOR TO PROVIDE UNISTRUT STAND. MOUNT LIGHT
FIXTURE, LIGHT SWITCH, RECEPTACLE, AND GENERATOR EPO TO
STAND. RECEPTACLE AND SWITCH SHALL BE IN 2-GANG
WEATHERPROOF ENCLOSURE AND MOUNTED AT 46".

ELECTRICAL PROPOSED SITE
PLAN

E-112



ELECTRICAL BASEMENT DEMOLITION PLAN

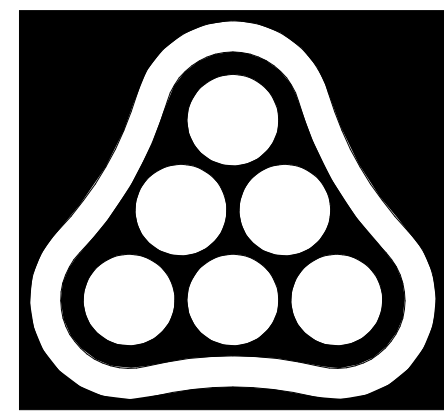
0' 4' 8' 12' 1/8" = 1'-0"

DEMOLITION GENERAL NOTES

1. DEMOLITION PLANS SHOW THE GENERAL EXTENT OF THE ELECTRICAL DEMOLITION WORK. THE ELECTRICAL CONTRACTOR SHALL DISCONNECT ELECTRICAL SERVICES TO ALL EQUIPMENT BEING REMOVED. SEE MECHANICAL PLANS. OWNER SHALL HAVE THE OPTION TO RETAIN REUSABLE ITEMS, SUCH AS COVERPLATES, RECEPTACLES, LIGHTS, PANELS, ETC. NOT BEING USED IN THE FINISHED WORK. COORDINATE WITH OWNER PRIOR TO STARTING DEMOLITION. PROPERLY AND LEGALLY DISPOSE OF ALL EQUIPMENT AND MATERIALS BEING REMOVED.
2. REMOVE ALL CONDUIT LEFT EXPOSED BY REMOVAL OF WALLS AND CEILINGS IN REMODELED AREAS. PLUG BOTH ENDS OF REMAINING CONDUIT IN WALL OR FLOOR WHERE CUT.
3. ELECTRICAL OUTLETS, ETC. POSSIBLY CONCEALED BY STORAGE SHELVING, CASEWORK, FURNITURE, ETC. ARE NOT SHOWN AND MAY REQUIRE REMOVAL.
4. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING ALL OPENINGS IN EXISTING CONSTRUCTION AFTER REMOVAL OF EQUIPMENT, RACEWAY SYSTEMS, OUTLET BOXES, ETC.
5. WHERE EQUIPMENT AND OTHER DEVICES ARE BEING REMOVED, THE CIRCUITING SHALL BE REMOVED, IF POSSIBLE, BACK TO POINT OF SUPPLY. WHERE REQUIRED, CIRCUITING SHALL BE EXTENDED TO MAINTAIN CONTINUITY OF THE CIRCUIT OR OPERATION OF THE SYSTEM.
6. ALL DEVICES SHOWN DASHED ON THE DEMOLITION PLAN(S) SHALL BE REMOVED, UNLESS NOTED OTHERWISE.
7. PROVIDE MATCHING BLANK COVERPLATES WHERE DEVICES ARE BEING REMOVED FROM FLUSH-MOUNTED OUTLET BOXES IN EXISTING WALLS TO REMAIN.
8. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO BEGINNING WORK.

KEYNOTES

- | | |
|----|---|
| D6 | EXISTING PANELBOARD TO BE REMOVED. ALL CONNECTED CIRCUITS ARE TO BE EXTENDED AND REFEED FROM NEW PANELBOARD 1"1". REFERENCE PANELBOARD SCHEDULE. |
| D7 | EXISTING ABANDONED TELECOMMUNICATIONS PANEL AND CABLEING TO BE REMOVED. |
| D8 | EXISTING PANELBOARD TO BE RELOCATED. ALL CONNECTED CIRCUITS ARE TO BE EXTENDED AND RECONNECTED AT NEW PANEL LOCATION. |
| D9 | EXISTING CIRCUIT BREAKERS TO BE REMOVED. ALL CONNECTED CIRCUITS ARE TO BE EXTENDED AND REFEED FROM NEW PANELBOARD 1"1". REFERENCE PANELBOARD SCHEDULE. |
| P1 | DOORS SHALL BE REPLACED WITH OUTWARD SWINGING DOORS PROVIDED WITH PANIC HARDWARE PER NEC 110.2(C)(2) AND 110.26(C)(3). PROVIDE REMOVABLE METAL TRANSOM ABOVE DOOR TO COVER EXISTING LOUVER. |



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JUNE 30, 2025

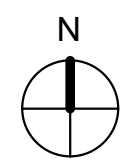


**Kingfisher County Courthouse
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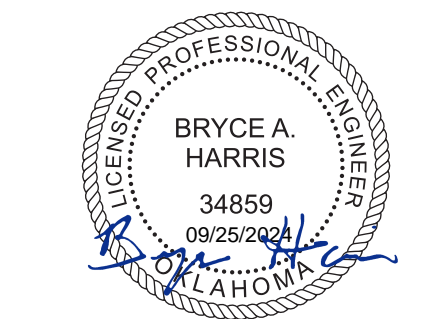
ELECTRICAL BASEMENT
DEMOLITION PLAN

E-131



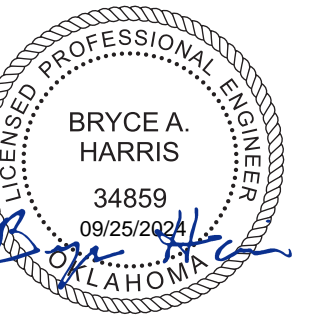
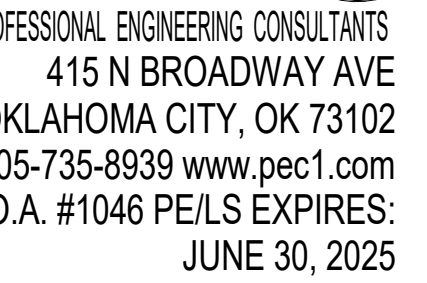
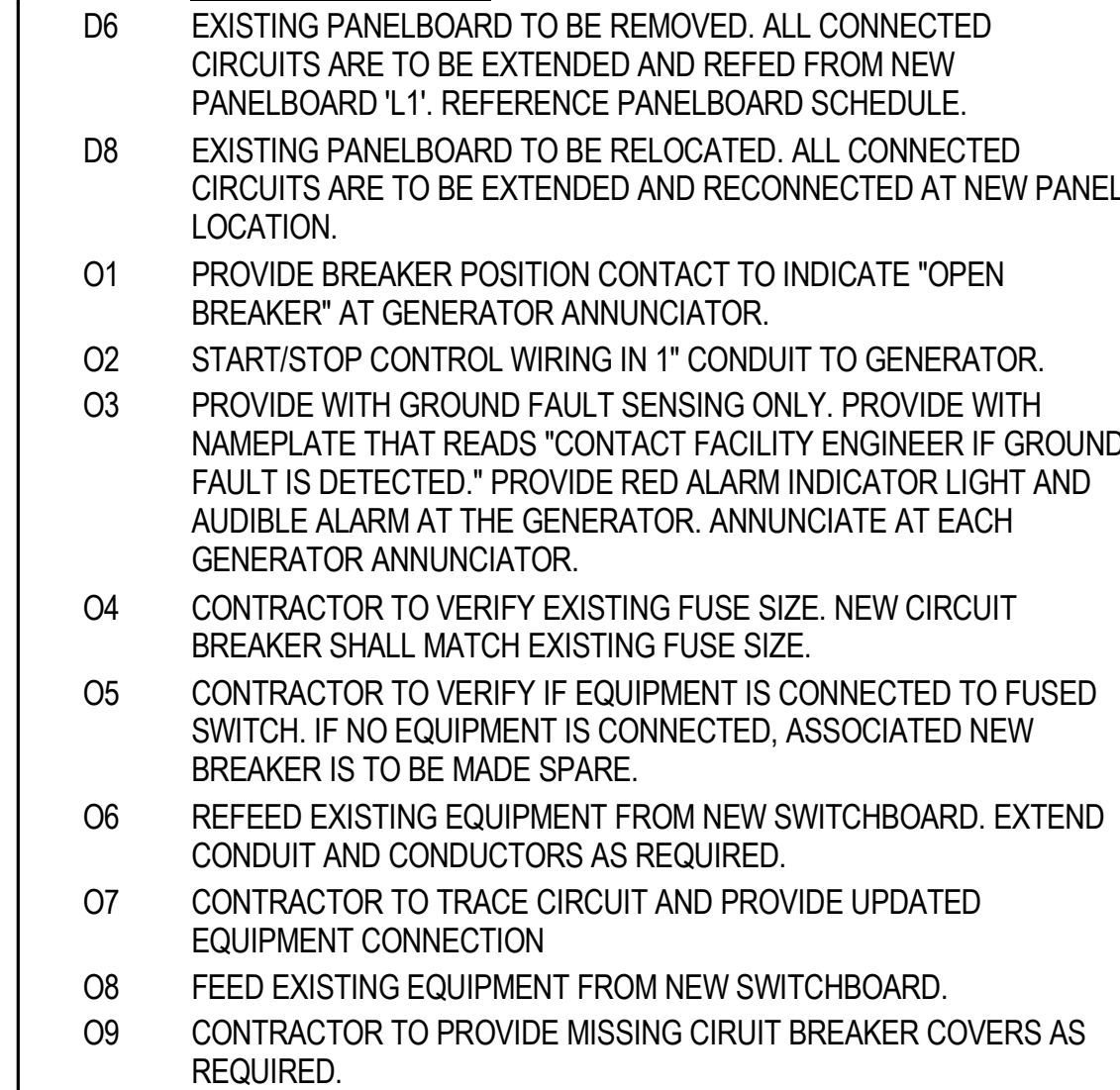
0' 4' 8' 12' 1/8" = 1'-0"

- | # | KEYNOTES |
|----|--|
| P1 | DOORS SHALL BE REPLACED WITH OUTWARD SWINGING DOORS PROVIDED WITH PANIC HARDWARE PER NEC 110.26(C)(2) AND 110.26(C)(3). PROVIDE REMOVABLE METAL TRANSOM ABOVE DOOR TO COVER EXISTING LOUVER. |



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E-132



NO SCALE

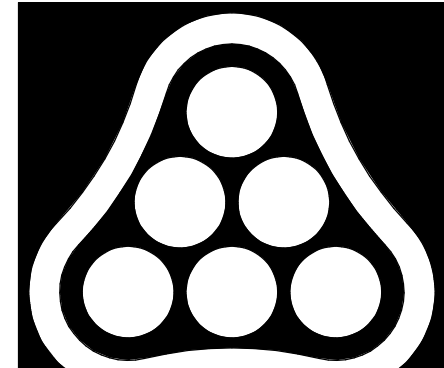
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**Kingfisher County Courthouse
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ELECTRICAL ONE-LINE DIAGRAMS

E-601



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JUNE 30, 2025



KINGFISHER COUNTY
COURTHOUSE GENERATOR

101 S Main St, Kingfisher, OK 73750

MP001

SECTION 200500 – COMMON WORK RESULTS FOR FIRE PROTECTION, PLUMBING, AND MECHANICAL

1.1 GENERAL CONDITIONS

- GENERAL CONDITIONS**
- A. The General Conditions, Supplemental General Conditions, Special Conditions and General Conditions Division 4 are part of this contract and shall be referred to as they apply to this section of the contract.
- 12. EXAMINATION OF SITE**
- A. The Contractor shall inspect the existing conditions, and check the drawings and specifications so as to be fully informed of the requirements for completion of the work. Lack of such information shall not justify an extra to the contract price.
- 13. SCOPE**
- A. The Mechanical Work shall include labor, materials, and equipment, including labor, materials, tools, transportation, equipment, services, and facilities, required for the complete, proper, and substantial installation of all mechanical systems shown on the contract drawings. The Contractor shall be responsible for the installation of all included all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems.
- B. Show on or in red ink on the drawings the location of all equipment to be installed. Return these notes to the Architect upon completion of the project.
- C. By bidding, the Contractor acknowledges his understanding of the work to be done and agrees to complete the work in accordance with the contract documents.
- 14. CODES AND STANDARDS**
- A. Excludes work in compliance with applicable Federal, State and Municipal laws, codes, ordinances, and local customs regarding the trade to perform the work. The Contractor is required to verify that all applicable codes with applicable codes. The codes applicable to this specific project may be listed on the Architect's code compliance sheet. If not, it is the Contractor's responsibility to determine the applicable codes solely to the satisfaction of the Architect.
- B. Codes shall govern in case of any direct conflict between codes and plans and specifications, except when plans and specifications require higher standards than those required by code. Variance from code to any other code shall be required to comply with code must be approved by the Architect. If approved, they shall be made with no increased cost to the Owner.
- 15. DEFINITIONS**
- A. The Contractor understands that the drawings and specifications complement one another, and items specified shall also meet the criteria set forth on the drawings.
- B. Where any item or device is referred to in the singular sense (such as "the unit"), such reference applies to any and all items or devices that are acceptable for installation as shown on the drawings.
- C. The term "work" shall mean all obligations imposed upon the Contractor by the contract documents.
- 16. ABBREVIATIONS**
- A. American Disabilities Act
AGA - American Gas Association
ANSI - American National Standards Institute
AMCA - Air Moving and Conditioning Association
BFW - Boiler and Pressure Vessel Code of ASME
CISPI - Cast Iron Soil Pipe Institute
CFPSA - National Fire Protection Association
CSA - Canadian Standards Association
ASHRAE - American Society of Heating, Refrigeration & Air-Conditioning Engineers, Inc.
ASME - American Society of Mechanical Engineers
ASTM - American Society for Testing and Materials
AWWA - American Water Works Association
BFW - Boiler and Pressure Vessel Code of ASME
CISPI - Cast Iron Soil Pipe Institute
CFPSA - National Fire Protection Association
CSA - Canadian Standards Association
ASHRAE - American Society of Heating, Refrigeration & Air-Conditioning Engineers, Inc.
UL - Underwriters Laboratories, Inc.
E - Estimating Laboratories, Inc.
OSHA - Occupational Safety and Health Administration
- 17. PERMITS**
- A. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the execution of this work.
- B. Pay fees and charges for connection to outside services and use of property.
- C. Deliver permits and certificates to the Architect for transmittal to the Owner.
- 18. UTILITY SERVICES**
- A. This Contractor shall pay for all expenses, deposits, reimbursements, etc., required by the local utilities and other service utilities to be connected to the building by the Owner.
- B. Consult gas, water, and sewer utility for their requirements and for coordinating with their installation. Contractor shall provide any water, this work required beyond that indicated by the drawings and specifications. Contractor shall bear all expense involved for the complete installation of the gas service (both temporary and permanent) to the building ready for operation, including utility service charges, except as specifically excluded on the plans.
- C. This Contractor shall coordinate with all departments to verify requirements and bid installation for service in accordance with local codes and Utility company rules and regulations.
- 19. RESPONSIBILITY**
- A. The Contractor shall be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through his operation.
- B. The operation and maintenance of the new Mechanical equipment during construction shall be the responsibility of this contractor. The Contractor shall be responsible for the building of the building.
- C. The General Contractor shall pay for all fuel cost for operation of the equipment, unless indicated otherwise in the specifications.
- D. The Mechanical and General Contractors shall coordinate to make all provisions for safety during existing construction if necessary. Contractors shall perform repairs necessary to restore the building to its original condition during the period of utility equipment and removal of residue, no disruption of the Owner's normal business shall occur.
- 20. WORK TO BE DONE BY GENERAL CONTRACTOR**
- A. Building equipment, elevators, chases, etc., for piping, as established, furnished, and set by this contractor.
- B. Mechanical Contractor shall furnish both, brackets, hangers, etc., required for work established and for equipment and for Contractor to build into concrete structure. General Contractor shall install all equipment sleeved free dampers, furnished by Mechanical Contractor, in walls and floors.
- C. Frame around and provide openings for ductwork, louvers, roof drains, etc.
- D. Build curb cut for stall for equipment, during the period of utility equipment.
- E. Provide heavy steel angle support under interior perimeter of roof curb for rooftop equipment. Metal deck and roof insulation shall be installed within the roof curb area of rooftop equipment for acoustical control.
- F. Provide fireproofing for roof curb area.
- G. Provide fireproofing for roof curb area.
- H. Provide fireproofing for roof curb area.
- I. Provide fireproofing for roof curb area.
- J. Provide fireproofing for roof curb area.
- K. Provide fireproofing for roof curb area.
- L. Provide fireproofing for roof curb area.
- M. Provide fireproofing for roof curb area.
- N. Provide fireproofing for roof curb area.
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- T. Provide fireproofing for roof curb area.
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- V. Provide fireproofing for roof curb area.
- W. Provide fireproofing for roof curb area.
- X. Provide fireproofing for roof curb area.
- Y. Provide fireproofing for roof curb area.
- Z. Provide fireproofing for roof curb area.
- 21. WORK TO BE DONE BY MECHANICAL CONTRACTOR**
- A. The Contractor shall be responsible for the installation of the following equipment, including all required permits for the function of this system unless specifically noted otherwise on the plans or in these specifications.
- B. Provide all low voltage wiring for the mechanical control system shall be furnished and installed by the Electrical Contractor under supervision of the Control Manufacturer's representative.
- C. Check mechanical specifications to verify wiring requirements for motor driven equipment. Provide conduit and wiring for the equipment including all required interlocking. Provide complete wiring for power factor correction capacitors.
- D. The Electrical Contractor shall install the power factor correction capacitors furnished by the mechanical Contractor.
- E. Mechanical Contractor shall furnish all motors, motor interlocking control devices, certain magnetic contactors, contactors, elevators, chases, etc., for piping, as established, furnished, and set by this contractor.
- F. Submittals shall include complete wiring diagrams and temperature control drawings for all the equipment furnished.
- G. The Contractor shall show the wiring connections, starters, auxiliary equipment, interlocking safety switches, separate control wiring, power supplies, for each and every item of equipment, etc., requiring wiring.
- H. Provide one copy of Engineer approved shop drawings showing all wiring and temperature control requirements of all mechanical equipment to the Electrical Contractor.
- 21.9 WORKSHOP AND COORDINATION**
- A. Make installation of equipment to be shown on the plans.
- B. Pipe and duct routing and equipment location shown on the drawings are schematic in nature. Make alterations to location of apparatus or piping as may be required to conform to building construction with minimum change.
- C. Equipment service clearances, or equipment manufacturers' specifications, shall be maintained from general construction. No pipe or ductwork shall be installed within these clearances. No piping, ductwork, or equipment shall be installed above electrical panels, starters, or switch gear, or in elevator equipment rooms.
- D. Cooperate with other contractors in their installation of work.
- E. The equipment shall be installed in a conspicuous place with a work space which it is necessary to maintain an even grade or specific slope on the piping.
- F. Use only experienced mechanics.
- 21.14 MATERIALS**
- A. Material and equipment shall be new, of best quality and design and free from defects. A manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment manufactured, made, address, and catalog number.
- B. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model, or catalog number, only such specific items may be used in the base bid, except as hereinafter provided.
- C. Unless requests for change in base bid specifications are received and approved and noted by the Architect, the Contractor shall be responsible for the installation of the equipment and materials.
- D. After request is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment".
- 21.15 SUBSTITUTION OF EQUIPMENT**
- A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents will be approved by the Engineer only if the equipment named in the contract documents cannot be obtained in a timely manner, or in proper sequence in the work of other contractors, due to conditions beyond control of the contractor.
- B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.
- C. The Owner shall receive all benefits of the difference in cost involved in any substitution, and the contractor altered by change order to credit Owner with any savings so obtained.
- 21.17 SUBMITTALS**
- A. Contractor shall submit to the Architect for approval submittals on all equipment, accessories, and materials.
- B. Submittals shall be in electronic form (PDF) and all submittals by each trade shall be submitted together as a package to be reviewed, marked thereon. Incomplete submittals packages or submittals not submitted as a package shall be returned to the Contractor.
- C. Where catalog cuts are used, mark them to indicate equipment, capacities, controls, fittings, valves, sizes, etc.
- D. Reference each item to applicable specification paragraph number and plan sheet number.
- E. Reference items not appearing in base specification to applicable alternate numbers, change order numbers, letters of authorization, etc.
- F. All drawings shall be checked and signed by the mechanical Contractor prior to submittal to the Engineer.

SECTION 220400 - PLUMBING

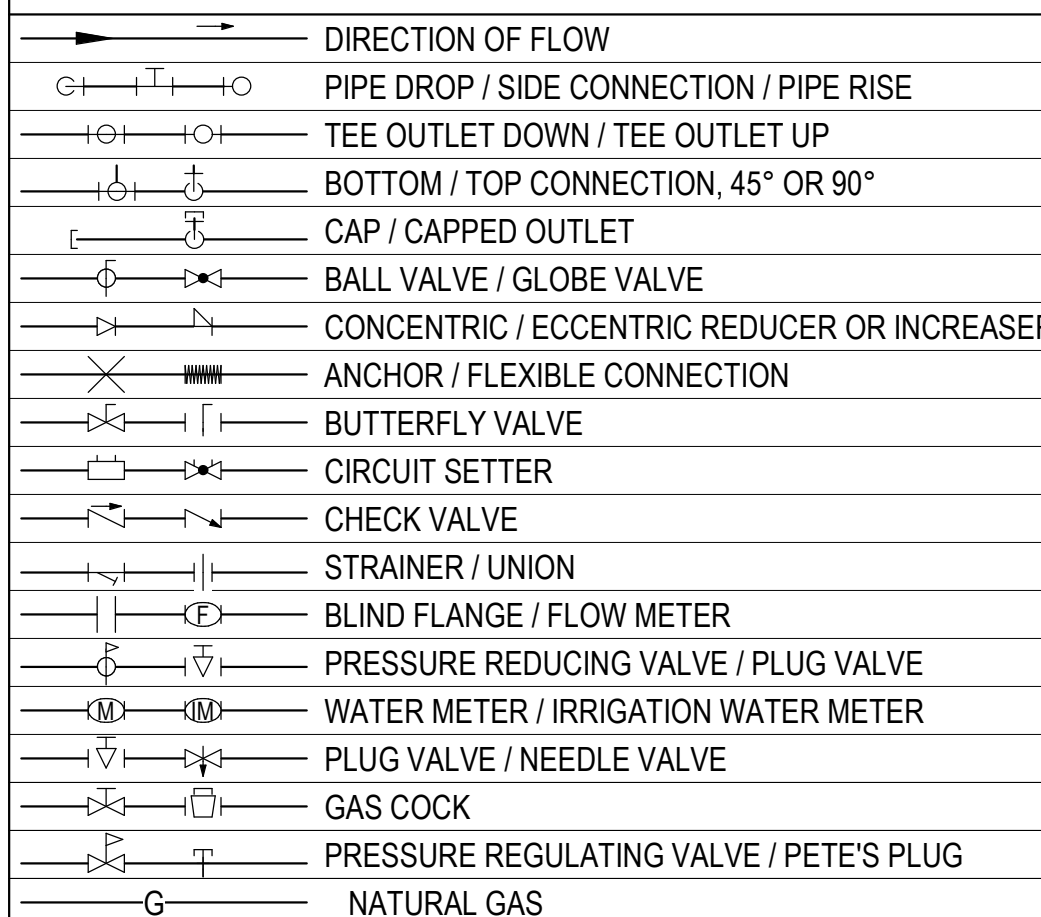
1.13 GAS SERVICE

- A. Meter and regulator will be installed by the gas company, but this Contractor shall rough-in piping and install the meter and regulator.
- B. Underground piping shall be PE-2406 plastic gas piping with heat fusion or compression fittings with built-in stiffeners and conforming to ASTM-D2513-73 or D2517-73. Install per manufacturer's instructions. Piping with 1/2" or larger connections be tested at 150 psi.
- C. The Gas Company will provide the installing contractor on the outside of the meter for the service line. The Mechanical Contractor shall install shut off valve and bring piping into the building. Use a flanged gas valve with an insulating flange guard and plastic sleeves for the bolts of the flanged joints.
- 1.14 GAS PIPING
 - A. Gas above grade shall be Standard Sch 40 black steel piping ASTM A53/A53M.
 - B. Joints: Pipe 2" and larger shall have standard threaded fittings. Pipe 1/2" and larger shall have welded fittings.
 - C. Piping at locations that are not accessible shall be continuous with no fittings or joints. Pipe shall be fully welded where applicable.
 - D. Underground gas piping shall be Sch 40 black steel piping with ASTM A53/A53M forged steel fittings and flanges and 1/2" welded joints. Provide ANWA C100 polyethylene jacket and double layer, half-lapped 10mil polyethylene tape.
 - E. Install gas cock extender to the building, on each gas line entering the building and at the exterior end of each line.
 - F. Gas Cocks 2 inch and Smaller: 150 psi WOG, bronze body, straightway pattern, square head, and hex nut.
 - G. Gas Cocks 2 1/2 inch and Larger: MS-SP-76, 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends.
 - H. Install a drip leg and a union for a rigid connection to each gas appliance unless noted otherwise on drawings.
 - I. Gas piping on the roof shall be supported at a minimum of 10' 0" of centers and at every change of direction.
 - J. Test gas piping in accordance with NFPA 54.
- 1.15 GAS PRESSURE REGULATORS
 - A. ANSI Z21.1 (UL 2201) 2" single stage, steel shrouded, corrosion-resistant pressure regulators.
 - Include atmospheric vent, regulation evaporator, with threaded ends for 2" and smaller and flanged ends for 1/2" and larger. Regulation pressure ratings, inlet and outlet pressures, and flow volume in accordance with listing.

1.15 GAS PRESSURE

- A. ANSI Z21.18 or ANSI Z21.18a, single stage, steel jacketed, corrosion-resistant pressure regulators. Include atmospheric vent, elevation compensator, with threaded ends for 2" and smaller and flanged ends for 2 1/2" and larger. Regulator pressure ratings, inlet and outlet pressures, and flow volume in standard cubic feet per hour are as indicated.

PIPE SYMBOLS



GENERAL DEMO. NOTES

1. VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK. BRING ANY DISCREPANCIES FROM THE DRAWINGS AND NOTES TO THE ARCHITECT IMMEDIATELY. MINOR CHANGES IN THE SCOPE OF THE DEMOLITION WORK SHALL BE APPROVED BY THE ARCHITECT.
2. EXISTING PIPING AND EQUIPMENT, ETC. NOT TO BE UTILIZED IN THE COMPLETED BUILDING SHALL BE DISCONTINUED OR REMOVED AS REQUIRED. ALL ENDS OF DISCONTINUED PIPING SHALL BE CAPPED IN THE NEAREST WALL, CEILING OR FLOOR SO THAT THEY ARE COMPLETELY CONCEALED FROM VIEW. ALL PIPING, VALVES, ETC. NOT TO BE UTILIZED IN THE COMPLETED BUILDING ARE REMOVED AND NOT REPLACED, SHALL BE PATCHED NEATLY WITH SIMILAR MATERIAL TO ADJACENT CONSTRUCTION. REFER TO DRAWINGS DELINEATING NEW WORK FOR ADDITIONAL INFORMATION REGARDING REPAIRS TO SYSTEMS OR PORTIONS OF SYSTEMS WHERE USE IS TO BE DISCONTINUED.
3. ALL EXISTING PIPING, VALVES, ETC. NOT TO BE UTILIZED IN THE COMPLETED BUILDING SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE OWNER IF THEY WISH TO RETAIN OWNERSHIP OF SAME. IF NOT, EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT SITE AS SHOWN ON THE DRAWINGS AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.
4. ALL CUTTING AND CHANNELING OF EXISTING BUILDING SHALL BE ACCOMPLISHED IN A NEAT AND WORKMANLIKE MANNER WITHOUT REMOVAL OF EXCESS MATERIALS. THIS CONTRACTOR SHALL PATCH AND REPLACE WITH MATCHING SIMILAR MATERIAL.
5. PORTIONS OF EXISTING SYSTEMS MAY BE SHOWN FOR CLARITY EVEN THOUGH IT MAY NOT BE NECESSARY TO MODIFY OR REVISE THEM. ALL EXISTING SYSTEMS ARE SHOWN BASED ON ORIGINAL OR REMODEL BUILDING DRAWINGS. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
6. ALL EXISTING PIPING, VALVES, ETC. NOT TO BE UTILIZED IN THE COMPLETED BUILDING SHALL BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.
7. ALL AVAILABLE ABANDONED PIPING SHALL BE REMOVED AND PROPERLY DISPOSED OF.
8. CAP ALL EXISTING PIPING SHOWN TO BE DISCONNECTED AND NOT REUSED AT MAIN. ALL ACCESSIBLE PIPING SHALL BE REMOVED.
9. RELOCATE EXISTING PIPING AS NECESSARY TO ACCOMPLISH FINAL INSTALLATION AS SHOWN. ALERT ENGINEER TO ANY MAJOR RELOCATIONS REQUIRED.

MECHANICAL ABBREVIATIONS

O	ROUND DIAMETER	HTG	HEATING
ABV	ABOVE	HTR	HEATER
AC	AIR CONDITIONING	HYD	HYDRANT
AD	AREA DRAIN	ID	INDIRECT
ADD	ADDENDUM	IN	INCH
AF	ABOVE FINISHED FLOOR	INV	INVERT
AFMS	AIRFLOW MEASURING STATION	LB	POUND
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	#	POUND
ALT	ALTERNATE	LB/HR	POUNDS PER HOUR
ARCH	ARCHITECT/ARCHITECTURAL	LAT	LEAVING AIR TEMPERATURE
BFF	BELOW FINISHED FLOOR	LWT	LEAVING WATER TEMPERATURE
BFG	BELOW FINISHED GRADE	LMT	MIXED AIR TEMPERATURE
BFP	BACKFLOW PREVENTER	MAX	MAXIMUM
BSF	BOILER FEEDWATER	MBH	ONE THOUSAND BTU PER HOUR
BLW	BELOW	MC	MECHANICAL CONTRACTOR
BOD	BOTTOM OF DUCT ELEVATION ABOVE FLOOR	MCH	MECHANICAL
BOP	BOTTOM OF PIPE ELEVATION ABOVE FLOOR	MFR	MANUFACTURER
BOS	BOTTOM OF STEEL	MIN	MINIMUM
BTU	BRITISH THERMAL UNITS	MISC	MISCELLANEOUS
BTUH	BRITISH THERMAL UNITS PER HOUR	MTR	MOTOR
CA	CAPACITY	NC	NOISE CRITERIA
CFM	CUBIC FEET PER MINUTE	NC	NORMALLY CLOSED
CI	CAST IRON	NO	NOT IN CONTRACT
CLG	CEILING	NO	NUMBER
CO	CLEANOUT	NO	NORMALLY OPEN
CP	COEFFICIENT OF PERFORMANCE	NTS	NOT TO SCALE
CV	CONSTANT VOLUME	OB	OPPOSED BLADE DAMPER
DB	DECIBELS	ORD	OVERFLOW ROOF DRAIN
DD	DRY BULB TEMPERATURE	PC	PLUMBING CONTRACTOR
DIA	DIAMETER	PD	PRESSURE DROP
DEMO	DEMOLISH	PV	POST INDICATOR VALVE
DN	DOWN	PLBG	PLUMBING
DP	DIFFERENTIAL PRESSURE	PRESS	PRESSURE
(E)	EXISTING EQUIPMENT DESIGNATION	PROT	PROTECTION
EA	EACH	PRV	PRESSURE REDUCING VALVE
ENT	ENTERING AIR TEMPERATURE	PVC	POLYVINYL CHLORIDE PIPE
EC	ELECTRICAL CONTRACTOR	PSI	POUNDS PER SQUARE INCH
ELEC	ELECTRICAL	PSIG	POUNDS PER SQUARE INCH GAUGE
ENTR	EXISTING TO REMAIN	(R)	POWER
EQUIP	EQUIPMENT	(R)	RELOCATED EQUIPMENT DESIGNATION
EW	ELECTRIC WATER COOLER	RD	ROOF DRAIN
EW	ENTERING WATER TEMPERATURE	REC	RECESSED
F	DEGREES FAHRENHEIT	RED	REDUCER
FDC	FLOOR CLEANOUT	RM	RELATIVE HUMIDITY
FD	FLOOR DRAIN	RM	ROOM
FDO	FIRE DEPARTMENT CONNECTION	RH	REVOLUTIONS PER MINUTE
FHC	FIRE HOSE CABINET	RF	ROOF FLASH
FL	FLOOR	SM	SHOULDER MOUNT
FLW	FLOW LINE	SP	STANDPIPE
FOG	FUEL OIL GAUGE	SP	STATIC PRESSURE
FOV	FUEL OIL VENT	ST	STEAM TRAP
FPM	FEET PER MINUTE	STM	STEAM
FS	FILTER SEPARATOR	TCM	TEMPERATURE CONTROL CONTRACTOR
FS	FLOOR SINK	TD	TEMPERATURE DROP
FT	FOOT FEET	TD	TRENCH DRAIN
FTR	FIN TUBE RADIATION	TOP	TOP OF PIPE ELEVATION ABOVE FLOOR
GAL	GALLON	TEMP	TEMPERATURE
GAS	GAS-FIRED	TMV	THERMOSTATIC MIXING VALVE
GC	GENERAL CONTRACTOR	TOD	TOP OF DUCT ELEVATION ABOVE FLOOR
GPM	GALLONS PER MINUTE	TYP	TYPICAL
GW	GREASE WASTE	UG	UNDERGROUND
H	HOSE BIB	UN	UNLESS NOTED OTHERWISE
HB	HOT WATER	V	VARIABLE AIR VOLUME
HR	HOSE REEL	VVT	VARIABLE VOLUME VARIABLE TEMP.
		VCT	VENTRIATED CLAY PIPE
		VENT	VENTILATION
		VTR	VENT THROUGH ROOF
		WB	WET BULB TEMPERATURE
		WH	WALL HYDRANT

GENERAL NOTES

1. VERIFY JOB SITE CONDITIONS AND DIMENSIONS BEFORE BEGINNING WORK. PLANS ARE SCHEMATIC IN NATURE. LAYOUT IS BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS.
2. REMOVE DUCTWORK, ETC. SHALL PERFORM STRUCTURAL MEMBERS.
3. PROVIDE MISCELLANEOUS CUTTING, PATCHING AND REPAIRING OF FINISHES, ROOF, WALLS, ETC., AS REQUIRED TO ACCOMMODATE THE NEW WORK.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY EXACT LOCATION, CONFIGURATION AND ROUTING OF EXISTING SYSTEMS REQUIRED TO REMAIN IN OPERATION DURING THE PROJECT TO PREVENT DAMAGE DURING DEMOLITION AND PHASING.
5. REMOVE ALL EXISTING EQUIPMENT, DUCTWORK AND PIPING THAT IS NOT REQUIRED FOR A WORKING INSTALLATION.
6. COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO INSTALLATION.
7. ALL CUTTING AND PATCHING SHALL BE CLOSELY COORDINATED WITH THE G.C.
8. COORDINATE ROUTING OF PIPING WITH STRUCTURAL ELEMENTS. PIPING SHALL RISE AND DROP, JOG OR OFFSET TO CLEAR EXISTING ELECTRICAL PANELS AND EQUIPMENT. TO RESOLVE CONFLICTS ARISING FROM LACK OF COORDINATION SHALL NOT JUSTIFY AN INCREASE IN THE CONTRACT AMOUNT.
9. ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL BE FIRE STOPPED BY THE TRADE MAKING THE PENETRATION. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
10. ALL NEW PIPING SHALL BE ELECTRICAL RATED. ELECTRICAL PIPING SHALL NOT BE ROUTED THROUGH ELECTRICAL ROOMS, UNLESS SPECIFICALLY SERVING THAT ROOM.
11. ALL WORK IS TO CONFORM WITH APPLICABLE CODES AND STANDARDS.
12. ALL NEW PIPING SHALL BE EPOXY MODIFIED.
13. UNDERGROUND-TYPE UTILITY MARKER, PROVIDED AND INSTALLED PER SPECIFICATION SECTIONS 2205553 AND 2305553 AT EVERY 100 FEET FOR ALL UNDERGROUND UTILITIES. LABEL WITH THE APPROPRIATE UTILITY.
14. THE DRAWINGS ARE ACCOMPANIED BY SPECIFICATIONS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

MECHANICAL SHEET INDEX

MP001	MECHANICAL COVER SHEET
M101	MECHANICAL SITE PLAN

[illegible]

JOB NO.	230855-001
DATE	09.25.2024
PM	T. DAY
DESIGNED BY	H.HODGES
DRAWN BY	H.HODGES
CHECKED BY	G. HIGGINSON

MECHANICAL COVER SHEET



Issue:		
JOB NO.	230855-002	
DATE	09.25.2024	
PM	T. DAY	
DESIGNED BY	H.HODGES	
DRAWN BY	H.HODGES	
CHECKED BY	G. HIGGINSON	

M101