PROJECT MANUAL

OTTUMWA MAINTENANCE BUILDING RENOVATION
OTTUMWA, IOWA

Project No. 19083501
Contract No. C329O3116

AUGUST 12, 2024

RDG PLANNING ● DESIGN

RDG Project No.: R3006.106.00

IOWA ARMY NATIONAL GUARD

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OTTUMWA MAINTENANCE BUILDING RENOVATION
OTTUMWA, IOWA

For The
IOWA ARMY NATIONAL GUARD

Project No. 19083501
Contract No. C329O3116

AUGUST 12, 2024

THE ARMORY BOARD
DEPARTMENT OF PUBLIC DEFENSE (MILITARY DIVISION)

THE ADJUTANT GENERAL
Major General STEPHEN E. OSBORN
CHAIRMAN OF THE ARMORY BOARD

ISSUED BY:

STATE COMPTROLLER OFFICE:

Zach Gillen, Contracting Officer
Camp Dodge, Building 3465 (W-41)
7105 NW 70th Avenue
Johnston, IA 50131-1824
Phone: (515) 252-4522

CONSTRUCTION & FACILITIES MANAGEMENT OFFICE:

Michael Brothers, Design Branch Chief
Camp Dodge, Building 3535 (B-61)
7105 NW 70th Avenue
Johnston, IA 50131-1824
Phone: (515) 252-4225

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DOCUMENT 00 01 02

PROJECT DESIGN TEAM:

ARCHITECT:

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www.rdgusa.com

MECHANICAL/ ELECTRICAL/ STRUCTURAL ENGINEER:

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Des Moines, IA 50322
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CIVIL ENGINEER:

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DOCUMENT 00 01 05

CERTIFICATIONS

ARCHITECTURAL

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly licensed architect under the laws of the State of Iowa.

David A. Streebin, AIA IOWA Lic. No. **5825**

Printed or typed name

8/12/2024

Signature Date

Registration Expires: June 30, 2025

Pages or sheets covered by this seal: Date Issued:

Project Manual pages identified in Table of Contents. **8/12/ 2024**

MECHANICAL

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed professional engineer under the laws of the State of Iowa.

Nathan K. Jacques, P.E. IOWA Lic. No. **P21686**

Printed or typed name

8/12/2024

Signature Date

Expiration Date: Dec. 31, 2024

Pages or sheets covered by this seal: Date Issued:

Project Manual pages identified in Table of Contents. **8/12/ 2024**

ELECTRICAL

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed professional engineer under the laws of the State of Iowa.

Kristen L. Spina, P.E. IOWA Lic. No. **P21081**

Printed or typed name

8/12/2024

Signature Date

Expiration Date: Dec. 31, 2025

Pages or sheets covered by this seal: Date Issued:

Project Manual pages identified in Table of Contents. **8/12/ 2024**

CIVIL

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed professional engineer under the laws of the State of Iowa.

MARCUS J. CLARK, P.E. IOWA Lic. No. **25057**
Printed or typed name

8/12/2024
Signature Date
Expiration Date: Dec. 31, 2025

Pages or sheets covered by this seal: Date Issued:
Project Manual pages identified in Table of Contents. **8/12/ 2024**

END OF DOCUMENT 00 01 05

DOCUMENT 00 01 10

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Legend:
IAARNG: Iowa Army National Guard
RDG: RDG Planning & Design
IMEG: IMEG
FRA: French-Reneker Associates

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IAARNG: Iowa Army National Guard
RDG: RDG Planning & Design
IMEG: IMEG
FRA: French-Reneker Associates

END OF DOCUMENT 00 01 10

Legend:
IAARNG: Iowa Army National Guard
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DOCUMENT 00 11 00

ADVERTISEMENT FOR BIDS

PROJECT TITLE:
OTTUMWA MAINTENANCE BUILDING RENOVATION

PROJECT LOCATION:
OTTUMWA, IOWA

BID DATE: SEPTEMBER 11, 2024

PROJECT NO.: 19083501

CONTRACT NO.: C329O3116

The Iowa Department of Public Defense, on behalf of the Iowa National Guard (IANG), will be receiving sealed bids until **12:00 P.M.** local time at the OTTUMWA READINESS CENTER, 2858 N COURT ST, OTTUMWA, IOWA 52501 for the proposed OTTUMWA MAINTENANCE BUILDING RENOVATION, OTTUMWA, IOWA. The general scope of work includes, but is not limited to:

Base Bid: Renovation of approximately 1,810 s.f. of existing Armory space to create an equipment locker room, to include, but not limited to new furnace/condensing unit, drying fans, lighting, and related electrical and fire alarm and detection work. Renovation of approximately 4,056 s.f. of existing Motor Vehicle Storage Building to create unit caged storage and new vehicle maintenance training bay, to include but not limited to, masonry walls, steel bollards, insulation, hollow metal doors and frames, sectional door in new opening, finishes, wire mesh partitions, new furnace/condensing unit, ERV, lighting (throughout entire building) exhaust fan, gas detection system, and related electrical work. Site work includes but is not limited to, new paved concrete access road and added parking spaces, chain-link fencing, pavement markings, and storm sewer.

Bids received will be opened and read aloud at the time and place stated. Late bids will not be considered. Bids must be hand-delivered (bids received via mail, delivery service, oral, telephonic, facsimile or other electronically transmitted bids will not be accepted). Interested parties are invited to attend.

Bids shall be submitted on the Bid Form and shall be accompanied by a Bid Security as set forth in the Instructions to Bidders in the amount of five percent (5%) of the total bid amount. Each bid shall be accompanied by a bid bond executed by corporations authorized to contract as surety in Iowa, cashier's check or a certified check drawn upon a solvent bank chartered under the laws of the United States of America, made payable to Iowa Department of Public Defense; as a guarantee that the accepted bidder shall enter into a contract with the State of Iowa and file an approved surety company Performance and Payment Bond for the faithful performance thereof. Upon failure to comply, said check or bid bond shall become forfeited as liquidated damages.

Any construction contractor performing work in Iowa (including out-of-state contractors) must comply with Chapter 91C of Iowa Code

Bidders must comply with all affirmative action/equal employment opportunity provisions of the State of Iowa and the Federal Government. The Iowa Department of Public Defense, Iowa Army National Guard, seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa. A listing of certified Targeted Small Businesses can be obtained by visiting the Iowa Department of Economic Development website at https://iowaeda.microsoftcrmportals.com/tsb-search/

The Iowa Department of Public Defense reserves the right to reject any and all bids, and to waive irregularities and to accept a bid that is deemed in the best interest of the State of Iowa and the IANG.

This project is exempt from Iowa Sales Tax. Davis Bacon Wages **will not** apply to this project.

Bidding Documents may be obtained from Beeline and Blue (2507 Ingersoll Avenue, Des Moines, Iowa 50312, (515) 244-1611 or 1-800-347-1610) and will be loaned to qualified contract bidders upon receipt of Master Builders of Iowa non-cash deposit card or a check in the amount of fifty dollars ($50.00) deposit per set payable to “Iowa Department of Public Defense”. Deposit will be refunded to bidders upon return of their complete set of Bidding Documents, including any addenda, properly bound and in good condition to Beeline and Blue within 14 calendar days after opening of bids. Cash deposits will not be accepted.

Bidding Documents may also be viewed online or downloaded at www.beelineandblue.com. Click on “EPLANROOM” and then “PUBLIC JOBS”. Register and log in, then select the project name or enter the project name in the search window.

The Plan Holders List may be viewed online at www.beelineandblue.com. Navigate to the project as outlined above and click on the “PLAN HOLDERS” tab.

For questions regarding the website, please call (515) 244-1611 or 1-800-347-1610.

A set of the Bidding Documents is also available for review at the Construction and Facilities Management Office, Bldg 3535 (B-61), Camp Dodge.

Award of this contract is dependent on receiving requested Federal and/or State funding. If such funding is not received within the sixty (60) day bid guarantee after the date of receiving bids, all rights and obligations under this agreement are considered null and void.

A Pre-Bid Conference will be held at **10:00 A.M.** local time**, THURSDAY, AUGUST 29** at the OTTUMWA READINESS CENTER, 2858 N COURT ST, OTTUMWA, IOWA 52501 to review the Plans and Project Manual and to answer questions on this project. All interested parties are invited to attend.

For further information regarding this project please call Michael Brothers at (515) 252-4225 or Zach Gillen at (515) 252-4522.

END OF DOCUMENT 00 11 00

DOCUMENT 00 21 00

INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

ARTICLE 1 - DEFINITIONS

1.1 The following definitions add to the list of definitions included in the General Conditions of the Contract and shall be used in conjunction with them as a part of the Bidding Documents.

1.2 Bidding Documents include The Bidding Requirements and the proposed Contract Documents:

1.3 The Bidding Requirements consists of:

.1 Advertisement For Bids.
.2 Instructions to Bidders.
.3 Form of Bid
.4 Supplements to Form of Bid:

.(1) Supplement A: Bid Bond .....(Submit With Form of Bid)
.(2) Supplement D: Targeted Small Business Form .....(Submit With Form of Bid)
.(3) Supplement F: Substitution Request Form (Bidding Phase).
.(4) Supplement G: Proposed Subcontractor Form.
.(5) Supplement H: Wage Rate Requirements Statement
.(6) Supplement J: 889 Representation Form

1.4 The Proposed Contract Documents consists of:

.1 Form of Agreement between the Owner and Contractor.
.2 Conditions of the Contract (General, Supplementary, and other Conditions).
.3 Drawings.
.4 Specifications.
.5 Addenda issued prior to execution of the Contract.
.6 Modifications issued after execution of the Contract.
.7 Other documents listed in the Agreement.

1.5 Definitions set forth in the General Conditions of the Contract for Construction or in other Contract Documents are applicable to the Bidding Documents.

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

1.7 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.

1.8 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work as described in the Bidding Documents.

1.9 An Allowance is a specified monetary sum, specified quantity or time not otherwise defined by the specifications or drawings, but which the contractor is required to include in the bid price.

1.10 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.

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

1.12 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

1.13 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 - RECEIPT AND OPENING OF BIDS

2.1 The Iowa Department of Public Defense (Military Division), Iowa Army National Guard, hereinafter called the Owner, will receive Bids at the OTTUMWA READINESS CENTER, 2858 N COURT ST, OTTUMWA, Iowa 52501, until the established bid date and time (see Section 00 41 00 - Form of Bid). The Owner will then publicly open and read all properly submitted Bids.

2.2 The Owner will secure, unopened, all Bids received prior to the established bid date and time. The Owner's representative whose duty it is to open Bids will decide when the specified time has arrived and will not consider any Bid received thereafter.

2.3 The Owner will reject and return unopened any Bid received after the time specified for the receipt of Bids.

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

2.5 Mailed or Delivery Service Bids will not be considered.

2.6 Each Bidder shall be solely responsible for the delivery of their Bid to the Owner at the place and before the time specified in Paragraph 2.1 above.

2.7 The Owner acknowledges the responsibility of the Iowa Public Bidding Requirements in advertising and receiving bids for this project.

ARTICLE 3 - BIDDING DOCUMENTS

3.1 Bidders may obtain complete sets of the Bidding Documents from the issuing entity designated in the Advertisement for Bid for the deposit sums stated therein. Deposits will be refunded as designated in the Advertisement for Bid.

3.2 Bidders and Sub-bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.3 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the Purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

ARTICLE 4 - PREPARATION OF BIDS

4.1 Prepare Bids on an exact copy of the "Form of Bid" included in these documents. Fill in all applicable blank spaces, typewritten or in ink. The amount must be in both words and figures. If words and figures do not agree, the amount as written in words shall govern.

4.2 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change".

4.3 The person signing the Bid must initial all erasures or corrections.

4.4 Bids must indicate the full name of the Bidder, must be signed in the firm or corporate name of the Bidder, and must bear the longhand signature of a principal duly authorized to execute contracts for the Bidder. Bids signed by an agent of the Bidder must be accompanied by evidence of the agent's authority to execute contracts for the Bidder. Type or print below the signature the name of each person signing the Bid.

ARTICLE 5 - SUBMITTAL OF BIDS

5.1 Enclose in its own sealed envelope the "Form of Bid for Construction Contract" separate from the other required Supplements to the Form of Bid identified below and label with the name of the Bidder and the following designation:

SEALED BID for:
OTTUMWA MAINTENANCE BUILDING RENOVATION
OTTUMWA, IOWA
Contract Number C329O3116
Iowa Army National Guard

5.2 Enclose in a second sealed envelope along with the separately sealed "Form of Bid for Construction Contract" the following Supplements to the Form of Bid:

1. Supplement A: The Bid Security (Contractor provided document).
2. Supplement D: Targeted Small Business Form (use provided form).

Label this second sealed envelope with the name and address of the Bidder and the following designation:

BID DOCUMENTS for:
OTTUMWA MAINTENANCE BUILDING RENOVATION
OTTUMWA, IOWA
Contract Number C329O3116
Iowa Army National Guard

5.3 **HAND CARRIED BIDS:** Deliver to address indicated in Article 2.1 above.

ARTICLE 6 - MODIFICATION OF BIDS

6.1 No modification of submitted Bids in any way or form will be permitted.

ARTICLE 7 - WITHDRAWAL OF BIDS

7.2 Any Bid may be withdrawn and resubmitted prior to the time set for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

7.3 No bid may be withdrawn for a period of sixty (60) calendar days after the time set for the receipt of Bids.

ARTICLE 8 - IOWA TARGETED SMALL BUSINESS REQUIREMENTS

8.1 PROGRAM DESCRIPTION AND REQUIREMENTS:

8.1.1 On construction contracts bid competitively for which a participation goal is indicated, each Bidder who is not a Targeted Small Business and who will be using a Certified Targeted Small Business Subcontractor or supplier must:

.1 Submit with the Form of Bid: Supplement D: Targeted Small Business Form provided herein.
.2 Comply with all relevant provisions of the Iowa Civil Rights Act, Chapter 601A; Executive Order #11, 1984, and #15, 1973, as appended by Executive Order #34, dated July 22, 1988; Federal Executive Order #11245, 1965, as amended by Federal Executive Order #11375, 1967; the Equal Employment Opportunity Act of 1972; and Iowa Code Section 19B.7.
.3 Comply with all provisions of the State of Iowa relevant to fair employment practices, and furnish all information and submit all reports requested by these provisions.

.4 Continue to use the Iowa Targeted Small Business certification guidelines as set out in 481-Chapter 25 of the Iowa Administrative Code for the purpose of identifying Targeted Small Businesses for participation in the award of general and subcontracts.

8.1.2 The mandatory set-aside requirements and bid preferences required by Iowa Code Sections 73.16 to 73.21 are not currently in effect. Use the following guidelines to encourage Targeted Small Business participation.

8.1.3 DEFINITIONS:

.1 Actively manage means exercising the power to make policy decisions affecting the business.
.2 Minority person means an individual who is black, Hispanic, Pacific Island native, American Indian, or Alaskan Native.
.3 Operated means actively involved in the day-to-day management of the business.
.4 Small Business means any enterprise which is located in this State, which is operated for profit under a single management, and which has either fewer than twenty employees or an annual gross income of less than three million dollars computed as an average of the three previous years.

8.2 The Department of Public Defense (Military Division), Iowa Army National Guard (IAARNG), seeks to provide opportunities for Targeted Small Businesses in the awarding of contracts. The IAARNG may award contracts to Targeted Small Businesses under the terms of the Iowa Small Business Procurement Act of 1986 and the Iowa Administrative Code. The IAARNG is also authorized to establish certified Targeted Small Business participation requirements for construction contracts.

8.3 When entering into this contract with the IAARNG, the General Contractor will take documented steps to encourage participation from Targeted Small Businesses for the purpose of subcontracting or supplying of materials. This project has a Targeted Small Business participation goal of ten percent (10%).

8.4 If a prime contractor fails to meet the Targeted Small Business participation goal indicated, the prime contractor shall still be required to submit with the Form of Bid (on the Targeted Small Business Form provided herein) the names of Targeted Small Businesses contacted.

8.5 If the Bidder intends to subcontract with a certified Targeted Small Business in the absence of a stated Targeted Small Business participation goal, the Bidder should inform the State Comptroller Office of this intent by submitting a Targeted Small Business Form so that they may receive credit for this participation.

ARTICLE 9 - BID SECURITY FOR TARGETED SMALL BUSINESS BIDDERS

9.1 On projects where Bid amount exceeds $25,000.00, the instructions in Article 10, Bid Security for Non-Targeted Small Business Bidders, apply.

9.2 On Bids of $25,000.00 or less, Certified Targeted Small Businesses, as part of the Bid Documents, may either provide a Bid Bond or a bond waiver from the Department of Economic Development.

ARTICLE 10 - BID SECURITY FOR NON-TARGETED SMALL BUSINESS BIDDERS

10.1 Secure Bids with a cashier's check, certified check, or a Bid Bond in an amount of at least five percent (5%) of the Bid. The Owner will automatically disqualify Bids secured by other means.

10.2 Make certified checks and cashier's checks payable to "IOWA DEPARTMENT OF PUBLIC DEFENSE".

10.3 Submit Bid Bonds in the form prescribed in these documents. Bid Bonds must be executed solely by corporations authorized to contract a surety in Iowa and, in addition to all other provisions, clearly designate an Iowa resident agent as attorney-in-fact. Attorneys-in-fact who sign surety bonds must file with each bond a certified and effectively dated copy of their power of attorney.

10.4 Bid security acts as the measure of liquidated damages which the Owner will sustain by failure, neglect, or refusal of Bidder to deliver a signed contract stipulating performance of the Work in unqualified compliance with Contract Documents within ten (10) days after notification of award of contract is given.

10.5 The Owner will return Bid security when submitted in the form of either a cashier's check or a certified check by any Bidder except the three lowest Bidders within forty-eight (48) hours after opening.

10.6 The Owner will all return retained Bid securities (cashier's check, or certified check) within forty-eight (48) hours of executing a contract, performance and payment bond with the successful Bidder. If the award process involves more than the bid holding time established in the Bidding Documents, those Bidders whose securities are retained shall have the right to negotiate with the Owner on the matter.

ARTICLE 11 - QUALIFICATION OF BIDDERS

11.1 Bidders must be registered with the Iowa Labor Commissioner. The Bidders must include an Iowa registration number as provided for on the Form of Bid.

11.2 Non-resident corporations submitting Bids must be in compliance with Section 490.1501 of the Code of Iowa and legally authorized thereby to carry on such business in the State of Iowa as is required by the Contract Documents.

11.3 Non-resident corporations certify by submittal of a Bid that the corporation shall comply with Chapter 73 of the Iowa Code.

11.4 The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder must furnish to the Owner all such information and data for these purposes as the Owner may request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Work described herein.

11.5 The Owner gives preference to Iowa domestic labor in the constructing or building of any public improvement. By virtue of statutory authority, preference is given to products and provisions produced or grown within the State of Iowa.

11.6 Bidders and all Subcontractors shall be prepared to represent post-bid whether they do or do not use prohibited telecommunications equipment or services in accordance with Section 889 Part B of the FY 2019 National Defense Authorization Act (NDAA). Refer to Article 22 – Post-Bid Information

ARTICLE 12 - SUBCONTRACTORS

12.1 In accordance with Iowa law, the successful Bidder must furnish in writing to the Owner a list of the names of subcontractors who will work on the project as described in Article 22.

12.2 The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this Contract must (1) be registered in the State of Iowa and have contractor's registration number, and (2) be acceptable to the Owner.

ARTICLE 13 - BIDDERS REPRESENTATION

13.1 Each Bidder by submitting a Bid represents that:

13.1.1 The Bidder has read and completely understands the Bidding Requirements and Contract Documents.

13.1.2 The Bidder has visited the site, become familiar with the local conditions under which the Work is to be performed, including availability and cost of labor and materials, and has carefully correlated personal observations with the requirements of the Contract Documents.

.1 A tour of the site will be conducted following the Pre-Bid Conference identified in the Advertisement for Bids. Bidders shall arrange for other site visits in advance by contacting **DAVID UNLAND** at **(515) 313-8096**.

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

13.1.4 The Bidder has familiarized himself/herself with Federal, State, and Local laws, ordinances, rules, and regulations affecting performance of the Work.

13.1.5 The Bidder agrees that the Contract Time will begin upon receipt of a Notice to Proceed from the Owner, and will achieve Substantial Completion of all the Work within the Contract Time stated on the Bid Form, excepting for delays covered in Article 8 of the General Conditions of the Contract.

13.1.6 The Bidder has given preference to use of Iowa domestic labor and products and provisions produced or grown within the State of Iowa.

13.2 Failure of the selected Bidder to fulfill the provisions of this Article in no way relieve the obligation of the Bidder to furnish all materials and labor necessary to carry out the provisions of the Contract, nor shall such failure constitute grounds for extra compensation over the price stated in the accepted Bid.

ARTICLE 14 - SUBSTITUTIONS

14.1 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.

14.2 No substitution will be considered during the bidding period unless written request has been submitted to the Architect for approval, on the form provided herein, at least 5 days prior to the bid date. Each such request must include the name of the material, product or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, cuts, performance and test data, and any other data or information necessary for a complete evaluation. The burden of proof of the merit of the proposed substitution is upon the proposer.

14.3 Request for approval of a substitution will not be considered if Substitution Request Form provided herein is not completely filled out.

14.4 If the Architect approves any proposed substitution, such approval is not official until set forth in an addendum. Do not include any substitutions not confirmed by written addenda.

14.5 Substitutions after the Contract Award may be considered only as provided for in the Conditions of the Contract and Division 1 of the Project Manual.

ARTICLE 15 - ADDENDA AND INTERPRETATIONS

15.1 Bidders must carefully examine and compare the Bidding Documents, examine the site and local conditions and at once report any ambiguity, inconsistency, or error discovered. Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make written request to the Architect for interpretation or correction. Such requests must reach the Architect at least seven (7) days prior to the bid date.

15.2 The Architect will issue any and all interpretations, corrections, revisions, and amendments to all holders of Bidding Documents in the form of written addenda. Addenda will be transmitted at least forty-eight (48) hours prior to the time set for the receipt of Bids to all who are known by the issuing office to have received a complete set of Bidding Documents. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose. Each Bidder is responsible to ascertain prior to submitting a Bid that the Bidder has received all Addenda issued. All addenda issued shall become part of the Contract Documents and Bidders must acknowledge them in the Form of Bid.

15.3 Only those interpretations, corrections, revisions, and amendments confirmed by written addenda are binding. Bidders are cautioned to refrain from including in their Bid any interpretations, corrections, revisions, or amendments which are not confirmed by written addenda.

15.4 Any question relating to the technical specifications may be directed to the individuals identified on Document 00 01 02 – Project Design Team.

ARTICLE 16 - BID PREFERENCE

16.1 All Bidders must certify their state or foreign country of residence by completing the official address section of the Form of Bid.

16.2 Under Iowa law, as described in the Iowa Administrative Code, resident Bidders on public improvements are allowed a preference equal to the preference given or required by the state or foreign country in which the nonresident Bidder is a resident. “Resident Bidder” means a person or firm authorized to transact business in this State, and having a place of business at which it is and has conducted business for at least six months prior to the first advertisement for the public improvement and, in the case of a corporation, at least fifty percent (50%) of the common stock is owned by residents of this State.

ARTICLE 17 - METHOD OF AWARD

17.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner may reject any or all Bids, waive any irregularities, informalities, or technicalities in any Bid, and accept any Bid in whole or in part which it deems to be in the Owner’s best interests.

17.2 All requested Alternates shall be bid. The Owner reserves the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternate(s) accepted.

17.3 Generally, all Bids received by the Owner which require allocation of appropriated Government funding are subject to the acceptance of the issuing department for the State of Iowa. Each prime Bidder, subcontractor, and material supplier on this project agrees to guarantee their Bid for a period of sixty (60) calendar days after the time set for the receipt of Bids.

17.4 Award of this contract is dependent on receiving requested Federal and/or State funding. If such funding is not received within the sixty (60) day Bid guarantee after the date of receiving Bids, all rights and obligations to enter into a contract are considered null and void.

17.5 The Owner sending a "Notice of Award" to the selected Bidder constitutes award of the Contract.

ARTICLE 18 - EXECUTION OF CONTRACT

18.1 Selected Bidder must, within ten (10) calendar days after receiving Notice of Award, enter into a written contract with the Owner on the Form of Agreement prescribed in these documents.

18.2 The Contract, when duly executed, represents the entire agreement between parties.

18.3 Simultaneously with the delivery of the executed Contract, the Contractor must furnish a performance and payment surety bond in the amount of 100% of the Contract Sum as security for faithful performance of the Contract and for the payment of all persons performing labor and furnishing materials for the work, or evidence of eligibility for waiver of the bond requirements. The bond shall be on the form prescribed in these documents (Submit one copy only). The surety on such bond shall be by a corporation duly authorized to do business in the State of Iowa, and said bond shall be signed or countersigned by an Iowa Resident Agent. Attorneys-in-fact who sign surety bonds must file with each bond a certified and effectively dated copy of their power of attorney.

18.4 Completed Contract and Contract Performance and Payment Bond must be dated the same and executed as per State contracting instruction procedures.

18.5 The Owner will maintain a contract administration system ensuring that contractors perform in accordance with the terms, conditions, and specification of their Contract Document.

ARTICLE 19 - IOWA STATE BUILDING CODE

19.1 All construction under this Contract must conform to the requirements of the Iowa State Building Code. Adhere to the provisions of the Iowa State Building Code which takes precedence over local governmental bodies' regulations. Perform work not regulated by the Iowa State Building Code in accordance with other applicable local regulations.

ARTICLE 20 - TAXES

20.1 This project is TAX EXEMPT. Refer to Article 3.6 of the General Conditions (as modified by the Supplementary Conditions) and Article 22.3 of the Instructions To Bidders.

ARTICLE 21 - PREBID CONFERENCE

21.1 The Owner requests Bidders to attend a pre-bid conference on the date, time, and location specified in the Advertisement for Bids.

ARTICLE 22 - POST-BID INFORMATION

22.1 Prior to consideration for Award of Contract, the Apparent Low Bidder shall submit for the general contractor and ALL subcontractors a completed:

22.1.1 Supplement J: 889 Representation Form.

.1 Failure of the bidding entity to successfully meet the requirements of Section 889 Part B of the 2019 NDAA, either through non-use of the prohibited equipment or meeting the mitigation requirements as outlined in Supplement J, will result in the bid being rejected. Failure to meet these requirements by a proposed subcontractor will result in their rejection and trigger the actions outlined in Section 22.2.1 below.

22.2 The Awarded Bidder shall, within forty eight (48) hours of notification of selection for the award of a Contract for the Work, submit:

22.2.1 Supplement G - Proposed Subcontractor Form:

.1 Include the following:

(1). A designation of the Work to be performed by the Bidder with his/her own forces.
(2). A list of names of the subcontractors or other persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work including but not limited to Mechanical Work, Electrical Work, Masonry Work, and Telecommunication Work (as applicable).
(3). The list must include Iowa Contractor's registration numbers for all Subcontractors.

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

.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or the Architect, after due investigation, has reasonable objection to any subcontractor, person or entity on such list. If the Owner or Architect has a reasonable objection to any subcontractor, person or entity on such list, the Bidder may, at the Bidder's option:

(1). Withdraw the Bid.
(2). Submit an acceptable substitute subcontractor, person or entity with an adjustment in the Base Bid or Alternate Bid to cover 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 under this subparagraph, bid security will not be forfeited, notwithstanding anything to the contrary in Paragraph "Bid Security" of this Section.

.4 Subcontractors and other persons and entities proposed by the Bidder and to whom the Owner and the 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 the Architect.

22.3 The Awarded Bidder shall, within one week following the Pre-Construction meeting and prior to purchasing any materials for the Work, submit a completed 'Sales Tax Exempt Application Form'. The Owner will email an electronic copy of the form to the General Contractor shortly after the Pre-Construction Meeting.

END OF DOCUMENT 00 21 00

DOCUMENT 00 31 00

GEOTECHNICAL EXPLORATION REPORT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geotechnical Exploration Report.

1.2 RELATED SECTIONS

A. Document 00 21 00 - Instructions to Bidders: Site Examination.

1.3 GEOTECHNICAL EXPLORATION REPORT

A. A copy of a geotechnical exploration report, with respect to the building site, is included herein:

1.	Title:	GEOTECHNICAL EXPLORATION OTTUMWA READINESS CENTER IMPROVEMENTS
2.	Dated:	July 17, 2023
3.	Prepared by:	Allender Butzke Engineers, Inc.

B. This report identifies properties of below grade conditions at a limited number of boring locations, offers recommendations for design, and was prepared primarily for the use of the Architect/Engineer. This report is not considered part of the Drawings, Specifications, or Contract Documents.

C. The Owner is making this report available to Bidders as information only and assumes no responsibility for its accuracy. This report, by its nature, cannot reveal all conditions existing on the site and any data indicated on the subsurface conditions are not intended as representations or warranties of the continuity of such conditions between soil borings. No claim will be considered if the Bidder relies on the information provided in this report in their bidding or their construction operations and subsequently finds that it is inaccurate.

D. Should subsurface conditions be found to vary substantially from this report based on testing and inspection or Contractor observation, the Contractor shall promptly notify the Architect/Engineer in accordance with the General Conditions of the Contract. Should changes in design and/or construction be required, such changes will be described by the Architect/Engineer and equitable adjustment in the Contract Sum or Contract Time, or both will be made in accordance with the General Conditions of the Contract.

END OF DOCUMENT 00 31 00

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ALLENDER BUTZKE ENGINEERS INC.
GEOTECHNICAL • ENVIRONMENTAL • CONSTRUCTION Q. C.

JULY 17, 2023 **PN 231205**

GEOTECHNICAL EXPLORATION

IOWA ARMY NATIONAL GUARD
OTTUMWA READINESS CENTER IMPROVEMENTS
2858 N COURT STREET
OTTUMWA, IOWA

PERFORMED FOR

IOWA ARMY NATIONAL GUARD
C/O RDG PLANNING AND DESIGN
301 GRAND AVENUE
DES MOINES, IA 50309

3660 109TH STREET • URBANDALE, IOWA 50322 • PHONE 515-252-1885 • FAX 515-252-1888

ALLENDER BUTZKE ENGINEERS INC.
GEOTECHNICAL • ENVIRONMENTAL • CONSTRUCTION Q. C.

July 17, 2023

Iowa ARNG
c/o RDG Planning and Design
301 Grand Avenue
Des Moines, IA 50309
Attn: Frank Buono, Partner

RE: Geotechnical Exploration
Iowa Army National Guard
Ottumwa Readiness Center Improvements
2858 N Court Street
Ottumwa, Iowa
PN 231205

Dear Mr. Buono:

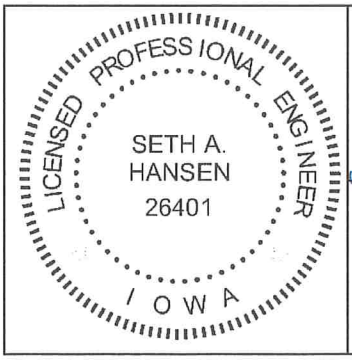
As authorized by you, Allender Butzke Engineers Inc. (ABE) has completed the geotechnical exploration for the above referenced project. The geotechnical exploration was conducted to evaluate physical characteristics of subsurface conditions with respect to design and construction of this project. The enclosed report summarizes the project characteristics as we understand them, presents the findings of the borings and laboratory tests, discusses the observed subsurface conditions, and provides geotechnical engineering recommendations for this project.

We appreciate the opportunity to provide our geotechnical engineering services for this project. If you have any questions or need further assistance, please contact us at your convenience. We are also staffed and equipped to provide construction testing and inspection services on this project as well as environmental site assessments.

Respectfully submitted,
ALLENDER BUTZKE ENGINEERS INC.

Seth Hansen, P.E.
Project Engineer

Matt Drummond, P.E.
Principal Engineer



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

7-17-2023

Seth A. Hansen, P.E. License Number 26401 Date

My license renewal date is December 31, 2023.

Pages covered by this seal: All Pages.

1 PC Above
1 Email French-Reneker; Attn: Stephen Pedrick, P.E.

GEOTECHNICAL EXPLORATION

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July 17, 2023

PROJECT INFORMATION

The Iowa Army National Guard (IANG), with design assistance from RDG Planning and Design (RDG), French-Reneker, and IMEG, are planning improvements to the existing readiness center located at 2858 N Court in Ottumwa, Iowa.

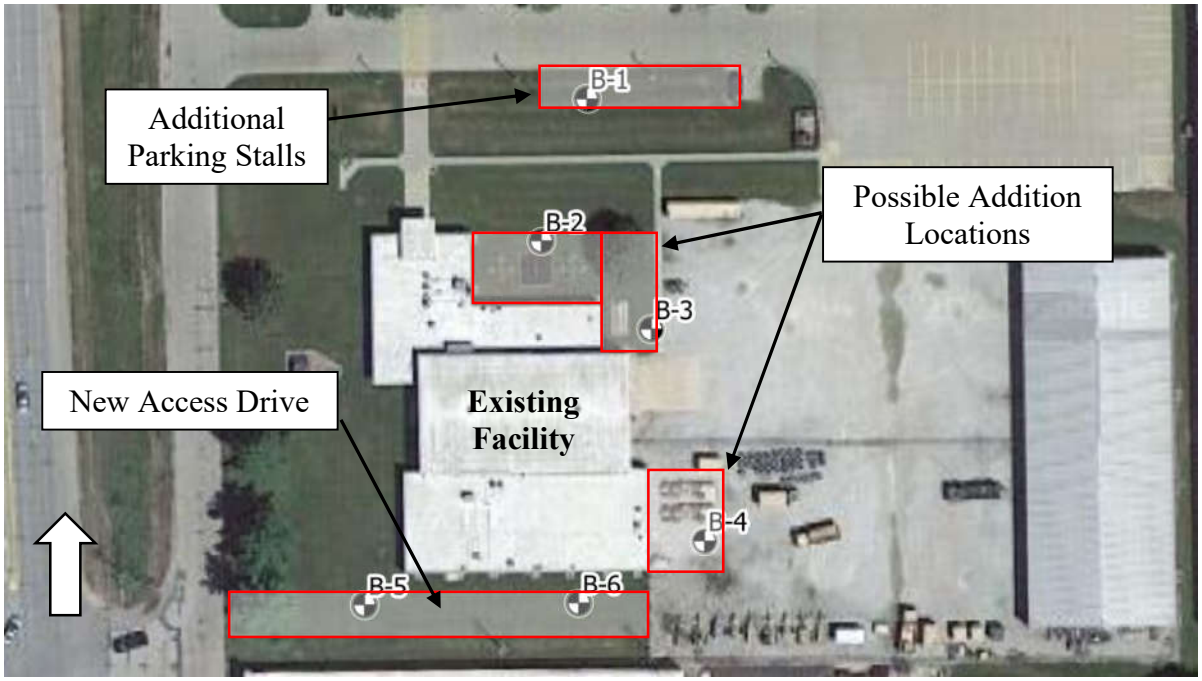


Figure No. 1 – Site Overview and Approximate Proposed Improvements

Preliminary, plans include construction of one or more building additions, additional parking stalls, and an access road on the south side of the site. The final location of the building addition(s) had not yet been selected at the time of this report but locations on the north or west sides of the existing building are being considered. We assume the finish floor elevation of the

addition(s) will match the finish floor elevation of the existing building which is reported to be between elevations 831.1 and 831.2 feet. We assume the addition(s) will generate light to moderate structural loads, i.e., maximum wall loads of 4 kips per lineal foot and maximum isolated column loads of 100 kips or less. The site is located in the upland northern area of Ottumwa and existing grades are very gently sloping. We anticipate minor cut and fill depths of 2 feet or less may be required to achieve desired final grades.

FIELD EXPLORATION

Six borings were conducted at this site to depths of 10 and 15 feet below existing grades on June 19, 2023. Approximate locations of the borings are shown on the enclosed Site Plan. Boring locations and ground surface elevations were determined by ABE using GPS survey equipment. The boring surface elevations, indicated on the enclosed Boring Logs, were Iowa Real-Time Network (RTN) derived. Methods of drilling, sampling, standard laboratory testing, and classifying of subsurface materials are discussed in the Boring Log Description/Legend pages of the Appendix.

SUBSURFACE CONDITIONS

Site Geology

This project site is located within a geomorphic region known as the "Southern Iowa Drift Plain". Soil stratigraphy generally consists of loess underlain by Pre-Illinoian glacial till. The loess is an eolian "wind-blown" deposit derived from flood plain sediments associated with major glacial meltwater streams and tends to have relatively uniform silt and clay particle sizes. Loess soils near the surface, termed B-horizon loess, have weathered over time and tend to have a higher clay content than the deeper unweathered loess. Similarly, the upper weathered portion of the Pre-Illinoian glacial till, referred to as paleosol, represents the former near surface soil before loess deposition and is typically a high clay content soil. The less weathered portions of the deeper Pre-Illinoian glacial till consist of a more homogeneous mixture of sand, silt and clay. Past development and site grading has removed portions of the B-horizon loess and loess in some areas and fill soils have been placed over the natural soils in other areas.

Soil Profile

Detailed descriptions of soils encountered by this exploration are provided on the Boring Logs enclosed in the Appendix. The Profile of Borings (Plate A-1) presented in the Appendix depicts the relative deposit elevations in the borings. Following is a discussion of the subsurface materials encountered in the borings. Unless otherwise indicated, the depths of soil stratum and groundwater levels are referenced from below existing grade at the individual boring locations at the time of drilling.

Crushed rock was encountered in Boring No. 4 conducted on the existing rock surfaced parking and outdoor storage lot. The crushed rock extended to a depth of 12 inches. Topsoil consisting of very dark brown lean to fat clay (CL-CH) was present at the ground surface in Boring Nos. 1, 2, 3, 5, and 6. The topsoil was damp and extended to depths between 0.5 and 1.5 feet.

B-horizon loess consisting of dark brown to brown fat clay (CH) underlaid the topsoil in Boring Nos. 1, 2, 3, 5, and 6 and the crushed rock in Boring No. 4. The B-horizon loess was damp to moist and stiff to very stiff. Below depths of 5 and 5.5 feet the stiff fat clay (CH) B-horizon loess transitioned moist to very moist and mediums stiff to stiff lean to fat clay (CL-CH).

Paleosol consisting of gray fat clay (CH) underlaid the loess between depths of 7.5 and 9 feet in all borings. All borings terminated in moist and medium stiff to stiff paleosol near depths of 10 and 15 feet.

Groundwater Level Observations

The borings were monitored during and shortly after drilling operations to detect moisture seepage and groundwater accumulation. The results of our groundwater level observations are noted on the Boring Logs enclosed in the Appendix.

During drilling operations, no moisture seepage was noted in any of the borings. Groundwater accumulation was observed near a depth of 12 feet in Boring No. 4 shortly after the completion of drilling operations while no groundwater accumulation was observed in the remaining borings. These short-term groundwater levels are not necessarily a true indication of the groundwater table. Long-term observations would be necessary to accurately define the groundwater variations at this site.

In this area, it is common to encounter a perched groundwater table within the loess present above the denser less permeable paleosol. Fluctuation of groundwater levels can occur due to seasonal variations in the amount of rainfall, surface drainage, subsurface drainage, site topography, irrigation practices, and ground cover (pavement or vegetation).

ANALYSIS AND RECOMMENDATIONS

Expansive Soil

The fat clay (CH) B-horizon loess soils encountered in the upper 5 to 5.5 feet of the test borings are moderately to highly plastic (Liquid Limit (LL) of 67 and Plasticity Index (PI) of 46) and are considered moderately expansive. These soils are subject to moderate volumetric change with changes in soil moisture content which can cause movement and distress to lightly loaded footings, floor slabs, and pavements. The most severe problems occur where higher clay content soils are in a natural state of low moisture or are highly compacted at moisture contents near or below optimum moisture content on a relatively incompressible base. Subsequent moisture content increases below the floor slab or pavement after construction then cause the expansive soils to swell appreciably possibly on the order of 1 to 2 inches. If the moisture content does not fluctuate much, then the soil swelling and heave will be minor.

To reduce the potential for future floor slab movement due to expansive soils, we recommend floor slabs bear on a minimum of 2 feet of low plasticity cohesive (LL $\leq$ 45 and PI $\leq$ 23) or cohesionless soils, a locally common remediation technique. A thicker low plasticity buffer would provide more protection against future shrink/swell movements. This recommendation will require undercutting and replacing existing moderately plastic soils with low plasticity cohesive, chemically stabilized on-site, or cohesionless soils. Chemical stabilization of the on-site soils by incorporating Portland cement, Class C fly ash or quicklime is further discussed in the *Site Grading* section of this report.

The deeper fat clay (CH) paleosol soils (LL of 72 and PI of 53) are considered highly expansive; however, based on boring information, the highly plastic soils (CH) are expected to remain 3 feet or more below the bottom of slab-on-grade floors and 2 feet or more below footings. Our experience indicates that footings and floor slabs bearing 2 and 3 feet, respectively, above the fat clay (CH) paleosol soils, generally have not been adversely impacted by the expansive nature of these deeper soils.

In our experience, frost-depth exterior and interior spread foundations having sustained bearing pressures in excess of 600 pounds per square foot can generally resist the swell pressures associated with expansive fat clay (CH) B-horizon loess soils. The sustained bearing pressure would include structural dead load, the weight of the footing, and weight of soil backfill on footing projections, if any. If the recommended sustained bearing pressure cannot be achieved then we recommend expansive soils be over-excavated to a depth of 2 feet below bottom of footing level and be replaced with low plasticity engineered compacted fill. As an alternative to over-excavation, the footings could be deepened to bear at a minimum depth of 6 feet below lowest adjacent grade such that the footing bears below the typical zone of seasonal moisture content fluctuations. Due to the deeper soft loess near this level designing for a lower bearing pressure of 1,500 would be appropriate.

As an alternative to over-excavating expansive soils and replacing them with low plasticity cohesive or cohesionless soils, the on-site expansive soils could be chemically stabilized using Class C fly ash, Portland cement, or dolomitic quicklime. In our experience, 18 percent Class C fly ash, 5 percent Portland cement, and 8 percent dolomitic quicklime based on the soils maximum dry unit weight as determined from Standard Proctor (ASTM D698) are required to adequately stabilize the on-site expansive soils. We recommend a rotary pulvamixer be used to thoroughly mix the chemical into the soil subgrade.

While over-excavation and replacement, chemical stabilization or providing the recommended non-expansive buffer generally reduces future floor slab movements to acceptable levels, these methods do not necessarily eliminate all movements. For this reason, it is advisable to design the slab-on-grade floors slabs to "float" free of edge-restraint at walls and columns, and to provide vertical space for movement of any non-load bearing walls setting on the slabs.

Typical movements due to moderately expansive B-horizon loess soils (CH) are similar to movements that pavements commonly experience from frost heave. Considering that proposed pavements will be subject to frost heave movements, the risk of movement due to moderately expansive B-horizon loess soils may be acceptable to the owner. If the owner chooses to accept the risk of possible future movements, we recommend pavements be supported on 1 foot or more of prepared compacted subgrade further discussed in the *Pavement Subgrade Preparation* section of this report. Subgrade condition and moisture content should be maintained until the slabs or pavements are placed. If the soil is allowed to dry prior to slab or pavement placement, the risk of

future slab movement would then increase. If the owner prefers to take a more proactive approach to reduce pavement movement due to expansive soils, pavements could bear on 1 foot or more of low plasticity cohesive (Liquid Limit of 45 or less and Plasticity Index of 23 or less), chemically stabilized on-site plastic soils, or cohesionless soils, such as drained crushed rock similar to Iowa DOT 4123 Modified Subbase. The planned 8 inches of crushed rock with drains would reduce, but may not eliminate, all movements from expansive soils or frost heave.

Newly planted vegetation (trees and shrubs) close to the building will remove moisture from the nearby soils. For example, Boring Nos. 2 and 3 suggest possible drier conditions near the ground surface extending to depths on the order of 2 to 3 feet near the existing mature tree located NE of the existing building. Foundations and floor slabs can potentially settle due to shrinkage of soils beneath the footings and floor slabs as the soils dry, especially during drought periods when mature trees withdraw for moisture from nearby soils. As a general guideline, trees and shrubs should be kept a minimum horizontal distance away from the building equal to the ultimate height of the vegetation. Likewise, irrigation next to the building should be limited since it can contribute to soil swelling.

Site Preparation and Grading

Prior to the placing of concrete floors or pavements on this site, or before any fill is placed, the organic and loose materials in addition to all vegetation must be stripped. We expect that a minimum stripping depth of 6 inches will be required. The stripping depths may vary due to localized variations in vegetation cover and subgrade stability. The strippings could be used for landscaping purposes in non-critical areas where support for foundations, floor slabs, and pavements is not required. Root balls and large roots from mature trees are also to be completely removed. Dry or desiccated soils, if present below floor slabs or footing level for the north addition would warrant deeper removal to reduce the risk of future swelling as these expansive soils regain moisture post-construction. The subgrade should then be proof-rolled to delineate zones of soft soils present near the surface which may require additional removal or compaction.

We recommend that low plasticity cohesive (LL $\leq$ 45 and PI $\leq$ 23) or cohesionless soils, free of rubble and organics, be used as compacted fill. The on-site lean to fat clay (CL-CH) and fat clay (CH) soils would not be suitable within 2 feet of floor slabs unless chemically stabilized as discussed in the *Expansive Soil* section of this report.

The following Table A lists recommended minimum compaction requirements for cohesive and cohesionless fill materials in specific applications. For cohesive soils, moisture contents within a range of -1 to +4 percent of the material's optimum moisture content are necessary to achieve the desired fill qualities. Soil compacted closer to its optimum moisture content will exhibit greater stability under repeated construction traffic.

TABLE A
RECOMMENDED DEGREE OF COMPACTION GUIDELINES

Construction Application	Standard Proctor (ASTM D698) Cohesive Soil	Standard Proctor (ASTM D698) Cohesionless Soil	*Relative Density (D4253 & D4254) Cohesionless Soil
Class 1	95%	98%	70%
Class 2	90%	93%	45%
Class 3	85%	88%	20%

Class 1 - Subgrade for building foundations, slabs-on-grade, pavements and other critical backfill areas.
Class 2 - Backfill adjacent to structures not supporting other structures - Minor subsidence possible.
Class 3 - Backfill in non-critical areas - Moderate subsidence possible.

*Use Relative Density technique (ASTM D4253 & D4254) where Standard Proctor technique (ASTM D698) does not result in a definable maximum dry density and optimum moisture content.

The on-site soils can be excavated utilizing conventional excavation equipment. Granular soils can generally be suitably compacted with vibratory compaction equipment whereas cohesive soils are more suitable for compaction with sheepsfoot or pneumatic type compactors. Care should be exercised in properly backfilling and compacting all trenches, especially utility trenches under or adjacent to the pavement. Loosely compacted or sand backfilled trenches can collect surface water and inadvertently direct it to the pavement subgrade and cause softening of the soil as well as increasing frost heave potential.

At the time of this geotechnical exploration, moisture contents of the B-horizon loess and loess deposits were generally above the recommended moisture content range for compaction. The upper 2 to 3 feet of Boring Nos. 2 and 3 were below optimum moisture content. Depending upon precipitation levels prior to and during construction, adjustment of soil moisture content may be

required in order to lower or raise the moisture to within the recommended moisture content range. Controlled wetting and discing may be necessary to raise soil moisture content of dry soils. Discing and aeration is generally the most economical method to lower soil moisture content, if climatic conditions allow. Chemical modification (drying) of very moist soils with Class C fly ash, Portland cement, or quicklime can be accomplished if construction scheduling does not permit field drying. Common chemical modification methods may not be reactive when temperatures are near or below 40° Fahrenheit if grading or fill placement at the site will be conducted during colder weather.

Excavation Stability and Dewatering

Boring information indicates excavations at the site for foundations and utilities will encounter predominately cohesive soils with no wet sand seams or layers. It is expected that the water seepage can be controlled by permitting it to drain into temporary construction sumps and be pumped outside the perimeter of the excavations.

The extent of bracing or sloping of open cut excavations will be dependent upon depth of cut, groundwater conditions, soils encountered, length of time the excavation will be open, area available for excavation and local governing regulations. Predominately cohesive soils may appear to stand nearly vertical in shallow excavations for short periods of time. However, soil creep, surcharge loads, precipitation, subsurface moisture seepage, construction activity vibrations and other factors may cause these soils to cave within an unpredictable period of time. Excavations encountering sand may tend to cave rapidly, especially if water is flowing through the sand. Unstable granular excavation walls may also cause surrounding cohesive soils to become unstable. Temporary shoring, flattening of the excavation slopes or use of trench boxes may be required to maintain a safe condition. Determining the appropriate OSHA classifications of the soil types encountered and implementing the required provisions for sloping, shoring, and bracing of excavations throughout the project during construction are the responsibility of the contractor per OSHA.

Foundation Design

It is our understanding the building addition(s) will have a similar finish floor elevation as the existing building which we understand is near elevation 831 feet. Therefore, we assume frost-depth exterior footings will bear about 4 feet below the finish floor or near elevation 827 feet while interior footings may bear about 2 feet higher or near elevation 829 feet.

Based on the soil profile, we anticipate exterior and interior footings will bear on 2 feet or more of stiff to very stiff B-horizon loess soils. We recommend that continuous and isolated spread foundations bearing on 2 feet or more of stiff B-horizon loess soils be proportioned for maximum net allowable soil bearing pressures of 2,500 and 3,000 pounds per square foot, respectively. We estimate long-term total settlement due to structural loads will be less than 1 inch and differential settlement may be on the order of ½ of the total settlement when foundations bear on newly placed engineered compacted fill and suitable natural soils.

As discussed in the Expansive Soil section of this report, if the recommended sustained bearing pressure of 600 psf cannot be achieved then we recommend expansive soils be over-excavated to a depth of 2 feet below bottom of footing level and be replaced with low plasticity engineered compacted fill. As an alternative to over-excavation, the footings could be deepened to bear at a minimum depth of 6 feet below lowest adjacent grade such that the footing bears below the typical zone of seasonal moisture content fluctuations. Due to the deeper soft loess near this level designing for a lower bearing pressure of 1,500 would be appropriate.

Structural and architectural connections should be designed to accommodate the differential settlement that may occur between the existing building and the new addition. Foundation excavations should be conducted in a manner that avoids disturbance of soils below the existing foundations.

Continuous foundations should be adequately reinforced to limit deflections caused by non-uniform soil support characteristics. All exterior foundations and foundations in unheated areas should be placed a minimum of 3.5 feet below final grade to provide protection against frost penetration and reduce movements associated with changes in soil moisture content. The on-site cohesive soils and newly placed cohesive fill would be suitable for trench foundations. Footing excavations should be kept free of water accumulation to prevent softening of subgrade soils.

Observations and test probing of the foundation subgrade soils should be conducted by an ABE geotechnical engineer to determine that the soils are compatible with the design criteria. If zones of soft or otherwise unsuitable soils are encountered at foundation level, we recommend that footings be extended to bear on firmer soils or an over-excavation and compacted backfill procedure be implemented. Over-excavations should extend 9 inches laterally in each direction beyond the foundation edges for each foot of over-excavation depth.

Floor Slab Support

We recommend floor slabs be supported on a minimum of 2 feet of low plasticity (LL ≤ 45 and PI ≤ 23) cohesive or cohesionless engineered compacted fill or chemically stabilized on-site plastic soils required to remediate the on-site expansive soils as discussed in the *Expansive Soil* section of this report. The floor slabs can be designed for a modulus of subgrade reaction value of 125 pounds per cubic inch when bearing on a minimum of one foot of prepared subgrade. Testing, observations and probing should be conducted during construction to delineate zones of soft soils which may require repair prior to concrete placement.

Pavement Subgrade Preparation

Uniform subgrade support is critical in pavement performance. As discussed in the *Expansive Soil* section of this report, there is risk of movement and cracking associated with constructing new pavements over the expansive B-horizon loess soils encountered at this site. The risk of pavement movements may be acceptable to the owner for economic reasons, as pavements are more easily repaired than footings and floor slabs. In our experience, movements that pavements experience due to the on-site moderately expansive soils are similar to movements that pavements experience due to frost heave are similar that pavements. Considering that proposed pavements will be subject to frost heave movements, the risk of movement due to moderately expansive soils may be acceptable to the owner.

If the owner chooses to accept the risk of future pavement settlement by constructing new pavements over existing fill, we recommend proof-rolling and technical observations be conducted by an ABE geotechnical engineer during subgrade preparation. As a minimum, we recommend that the prepared subgrade depth be at least 1 foot deep after fine grading or trimming and extend 2 feet beyond the edge of the pavements. The recommended 1 foot of compacted subgrade may necessitate undercutting and reworking soils in cut areas. Subgrade preparation to 1 foot depths for some soil types may not be suitable under repeated heavy construction vehicle loads and may require stabilization to greater depths.

If the owner prefers to take a more proactive approach to reduce pavement movement due to moderately expansive soils, pavements could bear on 1 foot or more of low plasticity cohesive (Liquid Limit of 45 or less and Plasticity Index of 23 or less), chemically stabilized on-site plastic soils, or cohesionless soils, such as drained crushed rock similar to Iowa DOT 4123 Modified Subbase.

Subgrade preparation should be completed shortly before paving operations commence and is to be maintained in suitable condition until paved. Damages caused by construction traffic or deterioration due to adverse weather are to be repaired prior to paving.

Depending upon conditions encountered at the time of construction, it may be necessary to moisture condition existing soils to achieve the recommended moisture content range of -1 to +4 percent of optimum moisture content. Soils compacted closer to optimum moisture content will exhibit greater stability under construction traffic loading. Suitable cohesive soil compacted to a minimum of 95 percent of maximum dry density determined by ASTM D698 would provide a design support capability equivalent to a CBR value of 3 or a modulus of subgrade reaction value of 100 pounds per cubic inch. Subgrade compaction, moisture content and depth should be verified by an ABE representative.

Subsurface Pavement Drainage

It is our understanding that the access drive will be supported on 8 inches of IDOT 4123 modified subbase. We recommend subsurface pavement drainage be installed to drain water that will infiltrate through cracks/joints in the pavement and/or behind curbs. Water that would otherwise tend to pond in the granular subbase would potentially cause softening of the underlying cohesive subgrade, increased shrink/swell, and increased frost heave potential.

The permeable subbase should be hydraulically connected to the free draining granular backfill (similar to Iowa DOT Specification 4131) in the subsurface drains. Subsurface drainage may be accomplished with the installation of drainlines similar to the Iowa Department of Transportation detail DR-303 or Iowa SUDAS Figure 4040.231. Subdrains beneath the parking lot should be spaced approximately 50 to 75 feet center to center and may be constructed to daylight or be connected to gravity flow storm drains capable of handling the discharge. We are available to review the subdrain layout design, once the final grading plan becomes available, which can be modified at time of construction to accommodate site specific variations in the soil profile and if seepage zones become evident.

Pavement Thickness Design

Traffic data was assumed based on past Iowa National Guard projects and is located in front of the Appendix. It is our understanding the new access drive will consist of 8 inches of

Portland cement concrete and be supported on 8 inches of modified subbase (Iowa DOT 4123) with suitable drainage as recommended in the preceding section. We assume vehicle traffic would be similar to other IANG projects and the planned 8 inches of PCC on 8 inches or more of modified subbase (Iowa DOT 4123) would be would be adequate.

We assume new POV parking stalls will consist of a thinner PCC section which may or may not include 8 inches of modified subbase. The following Table B summarizes alternate pavement thicknesses for typical lightly-loaded, moderately-loaded and heavily-loaded paved areas. If a minimum 6-inch-thick crushed rock base (such as IDOT 4123 Modified Subbase) with drains is constructed on the compacted subgrade to support the pavement, the recommended thicknesses of PCC or HMA pavement may be reduced by ½ and 1 inch, respectively. However, we recommend the lightly-loaded 5-inch-thick PCC pavement section not be reduced.

TABLE B
TYPICAL PAVEMENT THICKNESSES

Traffic Volume	Rigid: PCC [1]	Flexible: HMA [2]
Lightly-Loaded [3]	5" [4]	6"
Moderately-Loaded	6"	7"
Heavily-Loaded [5]	7"	8"

1) PCC - Flexural strength of 550 psi
2) Type A HMA - Structural coefficient of 0.44/inch
3) Automobile and 1 to 2 trucks average daily traffic
4) Thickness reduction due to crushed rock subbase does not apply
5) Entrances, delivery areas, dumpster areas or other areas of heavier truck traffic (25 trucks or less per day)

Pavements would require periodic maintenance consisting of sealing cracks/joints and replacement of isolated distressed areas. Thicker pavement sections would reduce maintenance and increase the pavement service life. Likewise, thinner sections would be expected to have a shorter service life that still may satisfy particular project needs but may require more maintenance. Other criteria which influence pavement service life include surface drainage, subsurface drainage, paving material quality, reinforcement, and joint design. Construction procedures involving placement, finishing, curing, jointing and weather protection can significantly impact pavement performance.

Frost Heave

Key elements contributing to frost heave including freezing temperatures, available water, and fine-grained frost susceptible soils are generally present at sites in Iowa. As a result, frost heave problems are generally common (and most noticeable) in pavements or sidewalks adjacent to non-frost susceptible elements such as manholes, light poles, and exterior doors or frost protected stoops. Frost heave can cause pavement cracks to develop parallel to and several feet from curbs. This generally occurs where cleared paved areas exposed to freezing temperatures heave more than adjoining paved areas insulated by piled snow. Areas cleared of snow not exposed to periodic sunshine during the winter, such as under canopies, on the north shaded side of buildings and other shaded areas may experience more frost heave than other sunshine exposed areas. Sometimes it is not readily apparent why frost heave problems occur at one location and not at another seemingly similar location.

While it is appropriate to implement measures to reduce frost heave such as insulation, replacing frost susceptible soils with less frost susceptible soils, void forms, sealing cracks/joints to reduce surface water infiltration, or drainage improvements (surface and subsurface), these measures may simply move the frost heave problem to a different location where preventative measures have not been implemented. Having a smooth transition between heaved and non-heaved areas is desirable, but may be difficult and/or costly to accomplish. We are available to consult with you to discuss options for your consideration to reduce frost heave potential on this project.

GENERAL

The analyses and recommendations in this report are based in part upon the data obtained from the soil borings performed at the indicated locations and from any other information discussed in this report. This report does not reflect any variations which may occur between borings or across the site. The nature and extent of such variations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

It is recommended that the geotechnical engineer be provided the opportunity to review the plans and specifications so that comments can be made regarding the interpretation and implementation of our geotechnical recommendations in the design and specifications. It is further

recommended that the geotechnical engineer be retained for testing and observation during earthwork and foundation construction phases to help determine that the design requirements are fulfilled.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranty, expressed or implied, is made. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report modified or verified in writing by the geotechnical engineer.

The scope of our service was not intended to include any environmental assessment or exploration for the presence of hazardous or toxic materials in the soil, surface water, groundwater, or air on, below or adjacent to this site.

APPENDIX

M1151	
Gross Vehicle Weight	11,500 pounds (5,216 kg)
Curb Weight	7,500 pounds (3,402 kg)
Payload	4,000 pounds (1,814 kg)
(A 1-5 Vehicles a week)	

M1165	
Gross Vehicle Weight	11,500 pounds (5,216 kg)
Curb Weight	6,550 pounds (2,971 kg)
Payload	4,950 pounds (2,245 kg)
(5-10 Vehicles a day)	

M916 TRUCK TRACTOR
Weight: 27,500 lbs.12,474 Kg **(1-5 a Week)**

M916, M916A1, M916A2, and M916A3:
Light Equipment, 6x6, 56,000 GVW
(1-3 Trucks a month)

M915 50,000 lbs. **(10 a week)**

M915A4 52,000 lbs. **(1-5 Vehicles a month)**

M915A5 120,000 lbs. (GCWR) **(Not very often)**

Oshkosh M-ATV
Weight: Curb weight: 27,500 lbs.(12,500 kg)
Gross weight: 32,500 lb (14,700 kg)
(10-15 a year)

PN 171278

M1074A1 Palletized Load System (PLS):
WEIGHT 24,040 kg (unladen with flatrack); 39,009 kg (GVWR); 61,462 kg
(5-10 Vehicles a month)

M998 A0 series:
Weight of 5,200 lbs. (2,400 kg), a payload of 2,500 lbs. (1,100 kg)
(5-10 Vehicles a day)

M1078A1P2 2.5-ton LMTV cargo:
Weight: 22,904 lbs. (curb w/fuel); 5000 lbs.(payload)
(Multiple trucks a day going in to the compound. About 10 a day)

BORING LOG DESCRIPTION/LEGEND

The material types encountered during the drilling operations were recorded on field logs. The profile represented on the Boring Log is based on final classification performed by a geotechnical engineer using the field logs, laboratory observation and testing. The material stratigraphy demarcation lines shown on the Boring Logs indicate changes in soil characteristics, however, actual soil changes or variations may occur as a gradual transition. Soil profile discussion, Log Boring information, water levels and recommendations presented in this report are based upon measured depths below ground levels existing at time of the field exploration, unless otherwise specified.

DRILLING AND SAMPLING

The borings were conducted with either a truck or all-terrain rotary drill rig using the drilling methods indicated on each Boring Log. Soil sampling and/or in-situ testing such as Shelby Tube (ST), split-spoon (SS), drive cone (DC), or core (C) was conducted at depth intervals which were selected in consideration of the characteristics of the proposed construction. Generally undisturbed soil samples are taken at 5 foot depth intervals or change in soil types. Disturbed soil samples from the auger, either jar size or bulk size samples, may be taken at intermediate intervals for the purpose of soil classification or laboratory testing. Borings conducted for soil classification only, will show no designation of sampling although disturbed sampling is performed. Soil samples obtained in the field were identified and sealed for transportation to the laboratory for performance of pertinent physical testing and engineering classification.

Drilling Methods

CFA - Continuous Flight Auger: 4, 6, or 8-inch diameter (ASTM D1452).
RD - Rotary Drilling: Using drilling fluid in cased or uncased boring (ASTM D2113).
HSA - Hollow Stem Auger: 6 or 8-inch diameter, continuous flight auger remains in boring with soil removed from the hollow stem through which undisturbed sampling is conducted.
HA - Hand Auger: 4-inch or less diameter.

Sample Types

ST - Shelby Tube: Thin-walled tube samples of cohesive soils (ASTM D1587).
SS - Split Spoon with 140 lb. manual hammer: Standard penetration test and split-barrel samples (ASTM D1586).
SSA - Split Spoon with 140 lb. automatic hammer: Standard penetration test and split-barrel samples (ASTM D1586).
DC - Drive Cone: Dynamic in-place testing of soil using a 2-inch diameter cone with a 60 degree point driven into the soil for continuous 1-foot intervals in the same manner as Split Spoon, no sample is obtained.
C - Core: Sampling hard soil or bedrock with a diamond core barrel in a rotary drill boring (ASTM D2113).
SPT - Standard Penetration Test: Number of blows required to drive sampler (split spoon or drive cone) into the soil with a 140-pound weight dropping a distance of 30-inches (ASTM D1586), number of blows recorded for each 6-inch interval in an 18-inch (or more) penetration depth, values shown are for each 6-inch interval (if series of number sets are shown) or a total of the last two 6-inch intervals (if only one number is shown) which is commonly referred to as "N" in blows per foot. High resistance is indicated by a high number of blows for a lesser penetration depth listed in inches.
BS - Bulk Sample: Disturbed.
CPT - Cone Penetration Test: Quasi-static in-place testing of soils using a 60 degree cone and friction sleeve which are steadily pushed into the soil and measure skin friction and end bearing (ASTM D3441).

STANDARD LABORATORY TESTING

Representative undisturbed soil samples obtained by the Shelby Tube sampler were tested for moisture content (ASTM D2216), density (dry) and unconfined compressive strength (ASTM D2166) in the laboratory. Results of these tests appear on the respective Boring Logs. Additional soil testing including particle size analysis (ASTM D422) and Atterberg Limits (ASTM D4318) may be conducted, if necessary, to define in more detail pertinent soil characteristics for classification in accordance with the Unified Soil Classification System. Specialized laboratory tests (if conducted) to determine pertinent soil characteristics are discussed in the "Laboratory Testing" section of the report.

WATER LEVEL MEASUREMENT

Water levels indicated on the Boring Logs are the levels measured in the borings at the times indicated. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with short term observations.

BORING LOG DESCRIPTION/LEGEND

DESCRIPTIVE SOIL CLASSIFICATION

Soil description is based on the Unified Classification System as outlined in ASTM Designations D-2487 and D-2488. This classification is primarily based upon visual and apparent physical soil characteristics, comparison with other soil samples, and our experience with the soil. Additional laboratory testing may be conducted, if necessary to define in more detail pertinent soil characteristics. The Unified Soil Classification group symbol shown on the boring logs corresponds with the group names listed below. The description includes soil constituents, moisture conditions, color and any other appropriate descriptive terms.

Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name
GW	Well-Graded Gravel	SW	Well-Graded Sand	CL	Lean Clay	CH	Fat Clay
GP	Poorly-Graded Gravel	SP	Poorly-Graded Sand	ML	Silt	MH	Elastic Silt
GM	Silty Gravel	SM	Silty Sand	OL	Organic Clay Organic Silt	OH	Organic Clay Organic Silt
GC	Clayey Gravel	SC	Clayey Sand			PT	Peat

RELATIVE PROPORTIONS			GRAIN SIZE TERMINOLOGY	
Descriptive Term(s) (Of components also present in sample)	Sand and Gravel % of Dry Weight	Fines % of Dry Weight	Major Component of Sample	Size Range
Trace	<15	<5	Cobbles	12 in. to 3 in. (300mm to 75mm)
With	15-30	5-12	Gravel	3 in. to #4 sieve (75mm to 4.75mm)
Modifier	>30	>12	Sand	#4 to #200 sieve (4.75mm to 0.074mm)
			Silt or Clay	Passing #200 sieve (.074 mm)

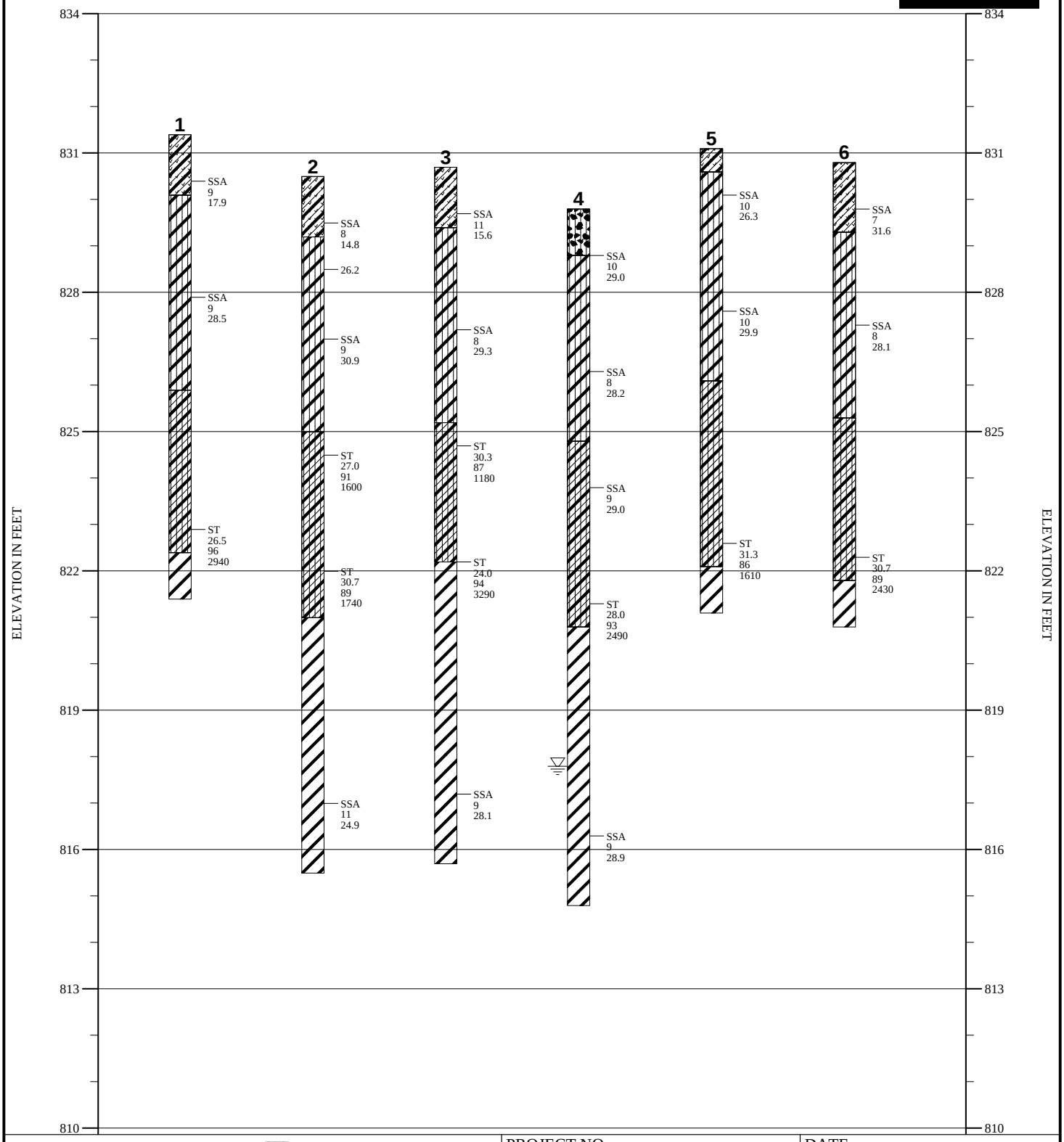
CONSISTENCY OF FINE-GRAINED SOILS			RELATIVE DENSITY OF COARSE-GRAINED SOILS	
Unconfined Compressive Strength, Qu, psf	Consistency	SPT, bpf	SPT, bpf	Relative Density
< 500	Very Soft	0-2	0-4	Very Loose
500-1,000	Soft	2-4	4-10	Loose
1,000-2,000	Medium Stiff	4-8	10-30	Medium Dense
2,000-4,000	Stiff	8-15	30-50	Dense
4,000-8,000	Very Stiff	15-30	50-80	Very Dense
8,000-16,000	Hard	30-100	80+	Extremely Dense
> 16,000	Very Hard	>100		

BORING LOG DESCRIPTION/LEGEND

ABBREVIATIONS

COMMONLY USED ABBREVIATIONS	
ft. or ' - feet	elev. - Elevation
in. or " - inches	% - Percent
psf - pounds per square foot	No. - Number
plf - pound per lineal foot	TB - Test Boring
pcf - pounds per cubic feet	N - blow count (SPT, bpf)
kip - 1000 pounds	USCS - Unified Soil Classification System
ksf - 1000 pounds per square foot	LL - Liquid Limit
klf - 1000 pounds per lineal foot	PL - Plastic Limit
tsf - tons per square foot	PI - Plasticity Index
bpf - blows per foot (SPT, N)	

PROFILE OF BORINGS



Strata symbols

- Lean to Fat Clay Topsoil
- Fat clay Loess
- Lean to Fat Clay Loess
- Fat Clay
- Crushed Rock or Gravel

Misc. Symbols

- Water table at completion

PROJECT NO.: 231205	DATE: 7/5/2023
PROJECT: Iowa ARNG Ottumwa Readiness Improvements 2858 N Court Street Ottumwa, Iowa	
PLATE: A-1	SCALE: 3 feet/in.

ALLENDER BUTZKE ENGINEERS, INC.

BORING LOG NO. 1

Project No.: 231205

Project: Iowa ARNG Ottumwa Readiness
2858 N Court Street
Ottumwa, Iowa

Client: Iowa ARNG c/o RDG Planning & Design
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: 831.4'
Datum: Iowa RTN Derived

Date Drilled: 6/19/2023
Drilling Depth, ft.: 10

Drilling Method: 4" CFA
Page: 1 of 1

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
831	0							Very dark brown lean to fat clay, trace organics, damp **TOPSOIL**		CL-CH		1.3
		1	SSA	9	17.9			Dark brown to brown lean to fat clay, damp		CH		830.1
828	3							**B-HORIZON LOESS**				
		2	SSA	9	28.5			Brown-gray, moist after 3.5'				5.5
825	6							Gray lean to fat clay, moist **LOESS**		CL-CH		825.9
	9	3	ST		26.5	96	2940	Gray fat clay, moist **PALEOSOL**		CH		9 822.4 10
822								End of Boring				821.4
819	12											
816	15											
813	18											
810	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: **Dry** ft. _____ ft. _____ ft.

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

BORING LOG NO. 2

Project No.: **231205**

Project: **Iowa ARNG Ottumwa Readiness**
2858 N Court Street
Ottumwa, Iowa

Client: **Iowa ARNG c/o RDG Planning & Design**
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: **830.5'**
Datum: **Iowa RTN Derived**

Date Drilled: **6/19/2023**
Drilling Depth, ft.: **15**

Drilling Method: **4" CFA**
Page: **1** of **1**

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
	0							Very dark brown lean to fat clay, trace organics, damp **TOPSOIL**		CL-CH		1.3
		1	SSA	8	14.8 26.2			Dark brown to brown lean to fat clay, damp LL=67, PI=46 Brown-gray, moist after 2' **B-HORIZON LOESS**		CH		829.2
828	3											
		2	SSA	9	30.9							
825												5.5
	6							Gray lean to fat clay, moist to very moist **LOESS**		CL-CH		825
		3	ST		27.0	91	1600					
822	9											
		4	ST		30.7	89	1740					9.5
								Gray fat clay, moist LL=72, PI=53 **PALEOSOL**		CH		821
819	12											
		5	SSA	11	24.9							
816	15											15
								End of Boring				815.5
813	18											
810	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: **Dry** ft. _____ ft. _____ ft.

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

BORING LOG NO. 3

Project No.: 231205

Project: Iowa ARNG Ottumwa Readiness
2858 N Court Street
Ottumwa, Iowa

Client: Iowa ARNG c/o RDG Planning & Design
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: 830.7'
Datum: Iowa RTN Derived

Date Drilled: 6/19/2023
Drilling Depth, ft.: 15

Drilling Method: 4" CFA
Page: 1 of 1

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
	0							Very dark brown lean to fat clay, trace organics, damp **TOPSOIL**		CL-CH		1.3
		1	SSA	11	15.6			Dark brown to brown lean to fat clay, damp		CH		829.4
828	3							**B-HORIZON LOESS**				
		2	SSA	8	29.3			Brown-gray, moist after 3.5'				5.5
825	6							Gray lean to fat clay, moist to very moist **LOESS**		CL-CH		825.2
		3	ST		30.3	87	1180					8.5
822	9	4	ST		24.0	94	3290	Gray fat clay, moist		CH		822.2
819	12							**PALEOSOL**				
		5	SSA	9	28.1							
816	15							End of Boring				15 815.7
813	18											
810	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: **Dry** ft. _____ ft. _____ ft.

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

BORING LOG NO. 4

Project No.: 231205

Project: Iowa ARNG Ottumwa Readiness
2858 N Court Street
Ottumwa, Iowa

Client: Iowa ARNG c/o RDG Planning & Design
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: 829.8'
Datum: Iowa RTN Derived

Date Drilled: 6/19/2023
Drilling Depth, ft.: 15

Drilling Method: 4" CFA
Page: 1 of 1

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
	0							**CRUSHED ROCK (12"+/-)**		GM		1
828		1	SSA	10	29.0			Dark brown to brown lean to fat clay, moist		CH		828.8
	3							**B-HORIZON LOESS** Brown-gray, moist after 3'				
		2	SSA	8	28.2							5
825								Gray lean to fat clay, moist to very moist		CL-CH		824.8
	6	3	SSA	9	29.0			**LOESS**				
822												
	9	4	ST		28.0	93	2490	Gray fat clay, moist		CH		820.8
819								**PALEOSOL**			▽	
	12											
816		5	SSA	9	28.9							15
	15							End of Boring				814.8
813												
	18											
810												
	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: 12 ft. ▽ _____ ft. ▽ _____ ft. ▽

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

BORING LOG NO. 5

Project No.: 231205

Project: Iowa ARNG Ottumwa Readiness
2858 N Court Street
Ottumwa, Iowa

Client: Iowa ARNG c/o RDG Planning & Design
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: 831.1'
Datum: Iowa RTN Derived

Date Drilled: 6/19/2023
Drilling Depth, ft.: 10

Drilling Method: 4" CFA
Page: 1 of 1

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
831	0							Very dark brown lean to fat clay, trace organics, damp **TOPSOIL**		CL-CH		0.5 830.6
		1	SSA	10	26.3			Dark brown to brown lean to fat clay, moist **B-HORIZON LOESS**		CH		
828	3							Brown-gray, moist after 2.8'				
		2	SSA	10	29.9							5
825	6							Gray lean to fat clay, moist to very moist **LOESS**		CL-CH		826.1
	9	3	ST		31.3	86	1610	Gray fat clay, moist **PALEOSOL**		CH		9 822.1
822												10
								End of Boring				821.1
819	12											
816	15											
813	18											
810	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: **Dry** ft. _____ ft. _____ ft.

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

BORING LOG NO. 6

Project No.: 231205

Project: **Iowa ARNG Ottumwa Readiness**
2858 N Court Street
Ottumwa, Iowa

Client: **Iowa ARNG c/o RDG Planning & Design**
301 Grand Avenue
Des Moines, Iowa 50309

Surface Elevation: **830.8'**
Datum: **Iowa RTN Derived**

Date Drilled: **6/19/2023**
Drilling Depth, ft.: **10**

Drilling Method: **4" CFA**
Page: **1** of **1**

Elevation ft.	Depth ft.	Sample No.	Type	SPT bpf	Moisture Content, %	Dry Density pcf	Unconfined Compressive Strength psf	Material Description*	Graphic Log	USCS	Water Level	Depth / Elevation ft.
	0							Very dark brown lean to fat clay, trace organics, damp **TOPSOIL**		CL-CH		1.5
		1	SSA	7	31.6			Dark brown to brown lean to fat clay, moist		CH		829.3
828	3							**B-HORIZON LOESS**				
		2	SSA	8	28.1			Brown-gray, moist after 3.5'				5.5
825	6							Gray lean to fat clay, moist to very moist **LOESS**		CL-CH		825.3
822	9	3	ST		30.7	89	2430	Gray fat clay, moist **PALEOSOL**		CH		821.8 10
								End of Boring				820.8
819	12											
816	15											
813	18											
810	21											

*The stratification lines represent the approximate boundary lines between material types: in-situ, the transition may be gradual.

Water Level Observation

Time: at completion _____ hrs. _____ days

Depth to water: **Dry** ft. _____ ft. _____ ft.

ALLENDER BUTZKE ENGINEERS, INC.

Geotechnical | Environmental | Construction Q.C.

ALLENDER BUTZKE ENGINEERS INC.
3660 109th Street
Urbandale, IA 50322

IANG Ottumwa Readiness Cener Improvements
2858 N Court Street
Ottumwa, Iowa

PN 231205

Site Plan

NOTES

DOCUMENT 00 41 00

FORM OF BID
for
CONSTRUCTION CONTRACT

I. PROJECT TITLE:
OTTUMWA MAINTENANCE BUILDING RENOVATION

PROJECT LOCATION:
OTTUMWA, IOWA

BID DATE: SEPTEMBER 11, 2024
AT: 12:00 p.m. Local time

PROJECT NO.: 19083501

CONTRACT NO.: C329O3116

TO: Iowa Army National Guard
State Comptroller Office
Attn: Contracting Officer
(Reference Section 00 21 00 for Submittal of Bids)

II. ACKNOWLEDGEMENT

A. The undersigned Bidder, in response to your Advertisement for Bids for construction of the above project, having examined the Drawings, Specifications, and other Bidding Documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the proposed Contract Documents within the time set forth therein and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the proposed Contract Documents of which this bid is a part.

B. Accompanying this proposal are the following required documents:

1) Supplement A: The Bid Security.....(Contractor provided document).
2) Supplement D: Targeted Small Business Form .....(use provided form).

C. Bidder acknowledges receipt of the following Addenda which are a part of the Bidding Documents:

Numbers _____ , _____ , _____ , _____ , _____ , _____.

III. LUMP SUM PROPOSAL

A. **BASE BID:** Bidder agrees to perform all of the work described in the proposed Contract Documents and shown on the Drawings for the Sum of:

_____

_____ Dollars ($ _____)

B. **Amounts will be shown in both words and figures. In case of discrepancy, the amount in words will govern.**

IV. SCHEDULE

A. It is estimated that work can commence by..…….. _____ (mm/dd/yyyy).

and be completed by……_____ (mm/dd/yyyy).

(Note: Not a bid award determining factor.)

V. SUBMISSION CONDITIONS

A. In submitting this bid, it is understood that the Owner reserves the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and Alternate(s) accepted.

B. Bidder hereby certifies: (a) that his bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm, or corporation; (b) that Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; (c) that Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; (d) that Bidder has not sought by collusion to obtain any advantage over any other bidder or over Owner.

VI. CONTRACTOR SIGNATURE

A. Respectfully Submitted:

Firm Name: _____ Telephone No.: _____

Official Address: _____ FAX No.: _____

_____ EMAIL: _____

Mailing Address: _____
(if different from above)

_____

Signed By: _____

Printed Name: _____

_____
(Title)

Date: _____

Federal ID No.: _____

Iowa Contractor Registration No.: _____

END OF DOCUMENT 00 41 00

DOCUMENT 00 43 13

SUPPLEMENT A:
BID BOND

(To be submitted with the Form of Bid if securing Bid with a Bid Bond)

AIA Document A310 - Bid Bond, 2010 Edition, is hereby a part of the Specifications as if it were bound herein.

Copies and samples for preview of the document can be obtained online from: https://www.aiacontracts.org/purchase.

END OF DOCUMENT 00 43 13

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DOCUMENT 00 43 16

SUPPLEMENT D: TARGETED SMALL BUSINESS FORM

(To be submitted with Form of Bid)

I. PROJECT TITLE:
OTTUMWA MAINTENANCE BUILDING RENOVATION

PROJECT LOCATION:
OTTUMWA, IOWA

PROJECT NO.: 19083501
CONTRACT NO.: C329O3116

Bidder's Company Name _____ Area Code/Telephone _____

Address _____ City _____ State _____ Zip Code _____

Bidder is _____ is not _____ a certified Iowa Targeted Small Business.

INSTRUCTIONS: Bidder shall provide the information requested below showing any Targeted Small Business Enterprise contacts made prior to bid submission for the project listed. Bidder shall use the construction-related Iowa Targeted Small Business Directory as certified by the Department of Economic Development, State of Iowa. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa. Information is subject to verification and confirmation.

TSB Company Name and Phone #	Date Contacted	Quote Rec'd (Y/N)	$ Amount Proposed (if quote used in bid)

(Use second sheet if needed)

Date _____ Signature of Bidder (same person signing the Form of Bid) _____

END OF DOCUMENT 00 43 16

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DOCUMENT 00 43 25

SUPPLEMENT F:
SUBSTITUTION REQUEST FORM (BIDDING PHASE)

TO: **FORWARD ALL SUBSTITUTION REQUESTS TO:**
Gene Macapinlac, RDG Planning & Design
1302 Howard Street, Omaha, NE 68102
Phone: (402) 392-0133 Email: gmacapinlac@rdgusa.com

PROJECT: OTTUMWA MAINTENANCE BUILDING RENOVATION, OTTUMWA, IOWA

Specification: Title, Section, Page, Paragraph / Article

_____

Proposed Substitution: Description, Manufacturer, Model, Phone No., Trade Name

_____

_____

_____

Product Data: Drawings, Specifications, Performance Data, Test Data – Attached

_____

_____

_____

The Undersigned Certifies: (Check each)

_____ Substitution is equal or superior in all respects to specified item.
_____ Will provide same warranty as specified item.
_____ Same maintenance service and source of replacement parts, as applicable, are available.
_____ Substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
_____ Substitution does not affect dimensions or functional clearances.
_____ Will coordinate installation and adjust other work which may be required, at no additional cost to the Owner.
_____ Waives claims for additional costs or time extensions which may subsequently become apparent.
_____ Will reimburse Owner for review or design services for re-approval by authorities, for changes in building design, detailing, and construction costs caused by the substitutions.

Requested By: _____ Signature: _____

Company: _____ Telephone: _____

Address: _____ Fax: _____

END OF DOCUMENT 00 43 25

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DOCUMENT 00 43 36

SUPPLEMENT G:
PROPOSED SUBCONTRACTOR FORM

(To be submitted within 48 hours of notification of selection for the award of a contract)

A. Work proposed to be performed by the Bidder with his/her own forces:

1. _____
2. _____
3. _____
4. _____
5. _____

(attach additional pages as required)

B. A list of names of the subcontractors or other 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 including but not limited to the following (as applicable):

1. Mechanical: _____
2. Electrical: _____
3. Masonry: _____
4. Geothermal:_____
5. Telecommunication: _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

(attach additional pages as required)

END OF DOCUMENT 00 43 36

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DOCUMENT 00 43 43

SUPPLEMENT H:
WAGE RATES REQUIREMENTS STATEMENT

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
NATIONAL GUARD BUREAU
111 SOUTH GEORGE MASON DRIVE
ARLINGTON, VA 22204-1382

RECEIVED
NOV 30 1993
FACILITIES & CONSTRUCTION

NGB-AEN

24 NOV 1993

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Applicability of Davis-Bacon Act

1. The purpose of this memorandum is to clarify the relation of the Davis-Bacon Act to State contracts.

2. All State contracts are exempt from the provisions of the Davis-Bacon Act even though they are funded by 100% Federal funds contributed to the State from the National Guard Bureau. 32 CFR 33.36 (i)(5) requires the use of the Federal Davis-Bacon Act only in cases where it is required by the Federal grant program legislation. Our authorization statues do not require the use of the Davis-Bacon Act. Therefore, the States must follow the applicable State law. Questions should be referred to the State full time Judge Advocate.

3. For further information, please contact Patrick Batt at DSN 327-7911.

FOR THE CHIEF, NATIONAL GUARD BUREAU:

Donald Frankland

DONALD R. FRANKLAND
LTC EN
Director of Engineering

DISTRIBUTION

Each TAG (1)

CF:
Each FMO (1)
Each USPFO (1)

AGIA-SJA 6 JAN 94

MEMORANDUM FOR CW5 JERRY KLINKEFUS

SUBJECT: APPLICABILITY OF DAVIS BACON ACT TO STATE CONTRACT ACTIVITY

1. As a result of my review of the code of IOWA, I have determined that the IOWA state contracting actions which use ARNG appropriations, do not require the Davis Bacon Act clause(s).

2. This is consistent with NGB guidance specific to National Guard appropriation and authorization language, part 31, Code of Federal Regulations.

EDWARD J STROBL, LT COL, IA ANG
STAFF JUDGE ADVOCATE

END OF DOCUMENT 00 43 43

MICRO-PURCHASE
NATIONAL DEFENSE AUTHORIZATION ACT (NDAA) SECTION 889 REPRESENTATION

For additional information see: https://www.acquisition.gov/FAR-Case-2019-009/889_Part_B

1. ☐ Merchant has an active registration in SAM (www.sam.gov) **and** FAR 52.204-26 is dated Oct 2020 (or later)
   ☐ Merchant is not registered in SAM (www.sam.gov) **or** is registered, but FAR 52.204-26 is dated earlier than Oct 2020

2. Company Name / Merchant (Offeror)	3. Date

4. Company Street Address	5. City	6. State	7. Zip Code

8. Owner or Designated Representative Name	9. E-mail	10. Telephone Number

11. DUNS Number (*if applicable*)	12. Cage Code Number (*if applicable*)	13. SAM Registration Expiration Date (*if applicable*)

14. Complete the following FAR 52.204-26 Representation:

COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES-REPRESENTATION (OCT 2020)

(a) *Definitions.* As used in this provision, "covered telecommunications equipment or services" and "reasonable inquiry" have the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(c)(1) *Representation.* The Offeror represents that it ☐ does, ☐ does not provide covered telecommunications equipment or services as a part of its offered products or to the Government in the performance of any contract, subcontract, or other contractual instrument.

(2) After conducting a reasonable inquiry for purposes of this representation, the offeror represents that it ☐ does, ☐ does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services

Signature of Owner or Designated Representative identified in Block 8 above. X

This representation expires on the date in block 13 or one year from the date in block 3, whichever is soonest. Forward any representation modifications/changes to the sender within 30 days.

Additional Disclosure Instructions to Merchant/Offeror (*if applicable*)

(a) If the Offeror represents in (c)(1) above that, "it *does* provide covered telecommunications equipment […]", then the Offeror should go to FAR 52.204-24 -- Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment, paragraph (e)(1) *Disclosures* (https://www.acquisition.gov/far/part-52#FAR_52_204_24) to identify the additional documentation that should accompany this representation when sending it back to the sender.

(b) If the Offeror represents in (c)(2) above that, "it *does* use covered telecommunications equipment […]", then the Offeror should go to FAR 52.204-24 -- Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment, paragraph (e)(2) *Disclosures* (https://www.acquisition.gov/far/part-52#FAR_52_204_24) to identify the additional documentation that should accompany this representation when sending it back to the sender.

GPC-Merchant 889 Representation v.4

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DOCUMENT 00 52 00

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

IOWA DEPARTMENT OF PUBLIC DEFENSE
(MILITARY DIVISION)

ARMORY BOARD
IOWA ARMY NATIONAL GUARD

STANDARD CONTRACT FOR CONSTRUCTION

STATE PROJECT: PROJECT NO.: 19083501
CONTRACT NO.: C329O3116

AGREEMENT

made as of the _____ day of _____ in the year of Two Thousand Twenty-Four (2024).

BETWEEN the Owner: Iowa Department of Public Defense (Military Division)
Armory Board, Iowa Army National Guard, Adjutant General Chairman
Camp Dodge, 7105 NW 70th Avenue, Johnston, Iowa 50131-1824

and the Contractor:

The Project: OTTUMWA MAINTENANCE BUILDING RENOVATION
OTTUMWA, IOWA

The Architect: RDG Planning & Design
1302 Howard Street
Omaha, NE 68102

Amount: $ _____

Payment to be made by: Iowa Department of Public Defense
State Comptroller Office
Building 3465 (W-41), Camp Dodge
7105 NW 70th Avenue
Johnston, Iowa 50131-1824

The Owner and the Contractor agree as follows:

ARTICLE 1 - THE CONTRACT DOCUMENTS

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

ARTICLE 2 - THE WORK OF THIS CONTRACT

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

ARTICLE 3 - DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 DATE OF COMMENCEMENT: The Contractor will be required to commence Work under this Contract by _____, after receipt by the Contractor of Notice to Proceed. The Contract Time shall be measured from the date of commencement.

3.2 SUBSTANTIAL COMPLETION: The Contractor shall achieve Substantial Completion of the entire Work not later than _____, subject to adjustments of this Contract Time as provided in the Contract Documents.

ARTICLE 4 - CONTRACT SUM

4.1 The Owner shall pay the Contractor in current funds for the performance of the Work, subject to additions and deductions by Change Order as provided in the Contract Documents, the Contract Sum of

$ _____

4.2 The Contract Sum is determined as follows:

BASE BID: $ _____

ARTICLE 5 - PROGRESS PAYMENTS

5.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor for the period ending on the last day of the month as provided in the Contract Documents and as follows:

5.1.1 Not later than 30 days following the date the Application for Payment is received by the Owner's Representative, ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of

the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the Site or at some other location agreed upon in writing, for the period covered by the Application for Payment, less the aggregate of previous payments made by the Owner, and upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for all incomplete Work, retainage applicable to such work and unsettled claims as provided in the Contract Documents.

5.2 Application for Payment: One (1) copy shall be submitted to the Architect via email in pdf format on AIA Document G702 - 1992, Application and Certificate for Payment, supported by AIA Document G703 – 1992, Continuation Sheet.

5.3 Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due in accordance with Section 573.12, Code of Iowa.

ARTICLE 6 - FINAL PAYMENT

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

6.1.1 The Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Subparagraph 12.2.2 of the General Conditions and to satisfy other requirements, if any, which extend beyond final payment;

6.1.2 all closeout documents required to be submitted with the final Application have been received by the Architect; and

6.1.3 a final Certificate for Payment has been issued by the Architect.

6.2 The Owner's final payment to the Contractor shall be made thirty days after the issuance of the Owner's Letter of Final Acceptance.

ARTICLE 7 - MISCELLANEOUS PROVISIONS

7.1 Terms in this Agreement which are defined in the Conditions of the Contract shall have the meanings designated in those Conditions.

7.2 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

ARTICLE 8 - FUNDING

8.1 Award of this contract is dependent on receiving requested Federal and/or State funding. If such funding is not received within the sixty (60) day bid guarantee after the date of receiving bids, all rights and obligations under this agreement are considered null and void.

ARTICLE 9 - ENUMERATION OF THE CONTRACT DOCUMENTS

9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

1. This executed Agreement
2. Any issued Addendums
3. Performance and Payment Bond
4. Application and Certificate for Payment
5. General Conditions of the Contract for Construction
6. Supplementary and other Conditions
7. Certificate(s) of Insurance
8. Certificate of Substantial Completion
9. General Requirements (Division 1)
10. Technical Specifications (All other Divisions)
11. Drawings

STATE OF IOWA:

Department of Public Defense (Military Division)
Armory Board, Iowa Army National Guard

By _____

_____
(Name Typed)

_____
(Title)

Iowa National Guard
(Address)

Camp Dodge, 7105 NW 70th Avenue

Johnston, Iowa 50131-1824

CONTRACTOR:

By _____
(Contractor)

_____
(Name Typed)

_____
(Title)

_____
(Address)

_____

Phone No.: _____

FAX No.: _____

Federal ID No.: _____

IA Registration No.: _____

NOTE: If the Contractor is a corporation, the following witness signatures are not required, but the annexed Certificate of Corporate Authority must be completed. Type or print names under all witness signatures.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the _____day of _____, 2024.

(Date to be completed by Owner upon receipt of all signatures.)

_____
State of Iowa - Witness Signature

_____
Printed Name

_____
Contractor – Witness Signature

_____
Printed Name

CERTIFICATE OF CORPORATE AUTHORITY

I, _____ certify that I am the
(typed name of corporate officer other than person signing Contract)

_____ of the corporation named as Contractor
(typed corporate office of person signing above)

herein; that _____, who signed this Contract on behalf of
(typed name of person who signed Contract)

the Contractor, was then _____ of said corporation;
(typed position of person signing Contract)

that said Contract was duly signed for and in behalf of said corporation by authority of its governing body,

and is within the scope of its corporate powers.

AFFIX YOUR CORPORATE SEAL TO THE BOTTOM OF THIS FORM IF ONE EXISTS

END OF DOCUMENT 00 52 00

DOCUMENT 00 61 00

PERFORMANCE AND PAYMENT BOND

AIA Document A312 – Performance and Payment Bond, 2010 Edition shall be utilized for this project and is hereby a part of the Specifications and Contract Documents as if it were bound herein.

Copies and samples for preview of the document can be obtained online from: https://www.aiacontracts.org/purchase.

END OF DOCUMENT 00 61 00

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DOCUMENT 00 62 10

APPLICATION AND CERTIFICATE FOR PAYMENT

AIA Document G702 (1992) – Application and Certificate for Payment Form, supported by AIA Document G703 (1992) Continuation Sheet shall be utilized for this project and is hereby a part of the Specifications and Contract Documents as if it were bound herein.

Copies and samples for preview of the document can be obtained online from: https://www.aiacontracts.org/purchase.

Note: Electronically submit Applications for Payment to the Architect or Engineer per the Supplementary Conditions.

END OF DOCUMENT 00 62 10

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DOCUMENT 00 72 00

GENERAL CONDITIONS

AIA Document A201-2007 – General Conditions of the Contract for Construction, hereafter referred to as General Conditions, forms the General Conditions for this Construction Contract and is hereby a part of the Specifications and Contract Documents as if it were bound herein.

Copies and samples for preview of the document can be obtained online from: https://www.aiacontracts.org/purchase.

END OF DOCUMENT 00 72 00

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DOCUMENT 00 73 00

SUPPLEMENTARY CONDITIONS

The following supplements modify the General Conditions of the Contract for Construction, AIA Document A201-2007. 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.

Unless noted otherwise, all references are to Articles and Sections of AIA Document A201-2007, General Conditions of the Contract for Construction.

See also related topics in Division 1 – General Requirements for additional requirements.

REFERENCE ARTICLE 1 - GENERAL PROVISIONS

1. Reference Section 1.1.1:

   A written order for a minor change in the Work may also be issued by the Owner's Construction Manager as provided in Section 2.1.1.5 of these Supplementary Conditions.

2. Reference Section 1.1.2; Add Sections:

   1.1.2.1 All contracts awarded by the State are subject to access by the State, National Guard Bureau, The Comptroller General of the United States, or any of their duly authorized representatives. This includes books, documents, papers, etc., and records of the Contractor which are directly pertinent to that specific contract for the purpose of making audits, examinations, excerpts, and transcriptions.

   1.1.2.2 Regulations for proper operation and administration of construction contracts: Code of Federal Regulations (CFR), provide solicitation provisions and contract clauses that pertain to this Project. A copy of these regulations are not bound herein, but are included by reference. Copies may be reviewed in the State Comptroller Office, Building 3465 (W-41), Camp Dodge, 7105 NW 70th Avenue, Johnston, Iowa 50131-1824.

3. Reference Section 1.2.1; Add Section:

   1.2.1.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

   .1 Modifications
   .2 The Agreement.
   .3 Addenda, with those of later date having precedence over those of earlier date.
   .4 The Supplementary Conditions.
   .5 The General Conditions of the Contract for Construction.
   .6 Division 1 of the Specifications.
   .7 Drawings and Divisions 2-49 of the Specifications.
   .8 Other documents specifically enumerated in the Agreement as part of the Contract Documents.

   In the case of conflicts or discrepancies between Drawings and Division 2-49 of the Specifications or within or among the Contract Documents and not clarified by Addendum, the Architect will determine which takes precedence in accordance with Sections 4.2.11, 4.2.12, and 4.2.13. In instances where conflict or discrepancy involves quality or quantities, the better quality or greater quantity of work will take precedence.

4. Reference Section 1.5; Delete Section 1.5.1 and substitute the following:

1.5.1 All Drawings, Specifications, and other Instruments of Service, and copies thereof, including those in electronic form, are and shall remain the Owner's property with the exception of one contract set for each party to the Contract.

5. Reference Section 1.5; Delete Section 1.5.2 and substitute the following:

1.5.2 The Drawings, Specifications and other Instruments of Service prepared by the Owner or Architect and Architect's consultants, and copies thereof furnished to, or made by, the Contractor, are for use solely with respect to this Project. They are not to be reproduced or used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of Work without the specific written consent of the Owner.

REFERENCE ARTICLE 2 - OWNER

6. Reference Section 2.1.1; Add Sections:

2.1.1.1 Unless otherwise indicated, the term Owner where referred to in the Contract Documents shall mean The Armory Board for the Iowa Army National Guard – Adjutant General Chairman.

2.1.1.2 The Owner's Representative shall be the State Contracting Officer for the Iowa Army National Guard – State Comptroller Office, executing the Contract on behalf of the State and any other officer or civilian employee properly designated Contracting Officer.

The Owner's Representative hereby authorizes the following persons to represent the Owner in the fulfillment of their respective duties as hereinafter described:

1. The Architect
2. The Owner's Construction Manager

2.1.1.3 Duties of the Owner's Representative

1. The Owner's Representative is authorized to act on behalf of the Owner and shall fulfill the duties, rights and obligations of the Owner under the Contract Documents.
2. The Owner's Representative will prepare and initiate Contract Change Orders in accordance with Section 7.2.
3. The Owner's Representative will have authority to reject Work that does not conform to the Contract Documents in accordance with Section 4.2.6 after review with the Architect.

2.1.1.4 Duties of the Architect

1. The Architect is as defined in Section 4.1.1 and shall provide administration of the Contract as described in the Contract Documents.

2.1.1.5 Duties of the Construction Manager

1. The Owner's Construction Manager shall act on behalf of the Owner in all daily actions and communication in accordance with Section 4.2.4.
2. The Owner's Construction Manager shall be responsible for communication and coordination of concerns of the Project to and from all persons within the Owner's organization.
3. The Owner's Construction Manager shall observe the progress of the Work and report any observed deviations from the Contract Documents to the Architect for a determination. The Owner's Construction Manager is not authorized to permit deviations from the Contract Documents.

4. The Owner's Construction Manager shall assist in coordinating the Contractor's operations with those of the Owner. The Owner's Construction Manager, however, shall not perform any duties for the Contractor.

5. The Owner's Construction Manager shall have the authority to, and may issue an order for a minor change in the Work in accordance with Section 7.4 after review with the Architect.

7. Reference Section 2.2; Delete Section 2.2.5 and substitute the following:

2.2.5 No copies of the Contract Documents will be furnished by the Owner to the Contractor with the exception of any complete sets of Bidding Documents returned to the issuing entity designated in the Advertisement for Bids. Additional reproductions may be made by the Contractor pursuant to Section 1.5.2.

8. Reference Section 2.2; Add Section:

2.2.6 The Owner will procure and bear costs of Special Inspections if required by applicable building codes for the project. See Section 13.5.1.1 of these Supplementary Conditions for additional requirements.

REFERENCE ARTICLE 3 - CONTRACTOR

9. Reference Section 3.1.1; Add Section:

3.1.1.1 Under Chapter 91C of the Iowa Code (1989), any construction contractor performing work in Iowa (including out-of-state contractors) is required to register with the Iowa Division of Labor. (See Article 11 of the Instructions to Bidders).

10. Reference Section 3.2.1; Add Section:

3.2.1.1 The Contract is executed as set forth in the Instructions to Bidders.

11. Reference Section 3.2; Add Sections:

3.2.5 Figured dimensions on the Drawings shall be used in preference to scaling the Drawings. If Contractor scales Drawings, dimensions so obtained shall be the sole responsibility of the Contractor.

3.2.6 Where the Work of the Contractor is affected by finish dimensions of manufacturer's equipment, the finish dimension shall be determined by the Contractor, who shall assume the responsibility for proper coordination.

3.2.7 If in the opinion of the Contractor it is not reasonably possible to provide first-class Work by following the procedures and requirements detailed or specified in the Contract Documents, the Contractor shall make a written request for interpretation to the Architect outlining the conditions and concerns. The Contractor shall not proceed with the portion of the Work in question until a response has been received from the Architect. The Architect shall respond with reasonable promptness.

12. Reference Section 3.3; Add Sections:

3.3.4 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties performed by the Owner or Architect in the Administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

3.3.5 The Contractor shall perform the Work so as to cause a minimum of inconvenience to and interruption of the Owner's operations. Any and all interruptions of the operations of the Owner necessary for the performance of the Work shall be noted in the progress schedule and the Contractor shall additionally give the Owner sufficient advance notice of such interruptions as to allow the Owner time to adjust its operations accordingly. Contractor's failure to give the Owner timely notice of such intentions shall place the responsibility for any resulting delays, additional costs, or other liabilities solely with the Contractor.

3.3.6 Prior to commencing the Work under the Contract, the Contractor shall contact all affected entities supplying utilities and arrange for the moving of such utility installations as is necessary for the performance of the Work. It shall be the responsibility of the Contractor to coordinate the Work with that of the affected entities in such a manner as to cause the least possible interference.

13. Reference Section 3.4.1; Add Section:

3.4.1.1 By virtue of statutory authority, give preference to Iowa domestic labor and materials in the execution of the Work, in accordance with provisions of Chapter 73, Code of Iowa, 1962, and amendments including Senate File 2160, dated April 11, 1984. Machinery, equipment, materials and articles installed or used without such approval are at risk of subsequent rejection.

14. Reference Section 3.4.2; Add Section:

3.4.2.1 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications).

15. Reference Section 3.5; Add Sections:

3.5.1 This warranty shall be for the period specified in the Contract Performance and Payment Bond unless a longer period is required elsewhere in the Contract Documents for certain portions of Work, in which case the longer period shall govern.

3.5.2 The general warranty provided herein is in addition to and not in limitation of the Contractor's obligations under Section 12.2 and any other warranty or remedy provided by law or by the Contract Documents.

3.5.3 The Contractor will furnish maintenance and 24-hour call-back service for the equipment provided and/or installed by the Contractor for a period of 3 months after the date of Substantial Completion. This maintenance and service will include repair and regular examinations of the equipment and installation by competent and trained employees of the Contractor, and all necessary adjustments, greasing, oiling, cleaning, supplies and parts required to keep the equipment in proper operations, except such parts made necessary due to misuse, accidents, or negligence not caused by the Contractor, Subcontractors, or Sub-subcontractors.

16. Reference Section 3.6; Delete Section and substitute the following:

3.6 TAXES

3.6.1 This project is TAX EXEMPT.

.1 The Iowa Department of Public Defense (DPD) is a registered Designated Exempt Entity (DEE) with the Iowa Department of Revenue (IAC chapter 701 - 19.12.) As a DEE, all contractors that are awarded a contract with the Department are issued a tax-exempt certificate for each project that allows the purchase of building materials or withdraw of inventory without incurring a state sales tax. This special exemption certificate would also allow a manufacturer of building materials to consume materials in the performance of a construction contract with a designated exempt entity, without owing tax on the fabricated cost of those materials.

.2 All Contractors responding to a DPD request for proposal should take this in to consideration when figuring out the cost of materials in the project proposal. Refunds for

state sales tax on building materials will not need to be considered in the proposal and are discouraged. For more information please refer to:

https://tax.iowa.gov/construction-contracts-designated-exempt-entities

.3 If the contract includes machinery or equipment, the contractor must purchase it for resale and give the supplier a regular exemption certificate (issued from DPD). The contractor should not charge sales tax on machinery and equipment sold to DPD.

17. Reference Section 3.7.2; Add Section:

    3.7.2.1 Compliance with the above shall not preclude the establishment of and compliance with non-conflicting higher standards as may be specified or indicated elsewhere in the Contract Documents.

18. Reference Section 3.7.4; Add Sections:

    3.7.4.1 The conditions described in the first sentence include any conditions which the Contractor will consider as the basis for a claim for extra compensation and include but are not limited to materials containing asbestos, polychlorinated biphenyl (PCB), or other hazardous materials.

    3.7.4.2 By failing to give notice within the time allotted above, the Contractor waives all rights for extra compensation of any kind arising out of the concealed or unknown conditions.

19. Reference Section 3.7.5; Modify Section by adding the underlined words, so that the section now reads as follows:

    3.7.5 If, in the course of the Work, the Contractor knowingly encounters and recognizes human remains, burial markers, archeological sites or previously undelineated 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 or good faith belief of such existence of such remains or features may be made as provided in Article 15.

20. Reference Section 3.7; Add Sections:

    3.7.6 See Section 10.7 of these Supplementary Conditions for Stormwater Pollution Prevention Plan and Permit requirements.

    3.7.7 The Contractor must recognize mandatory standards and policies relating to energy efficiency contained in the State Energy Conservation Plan issued in compliance with the Energy Policy and Conservation Act (PL 94-163).

21. Reference Section 3.9.1; Modify the first sentence by adding the underlined words, so that the first sentence now reads as follows:

    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 (including work performed by subcontractors).

22. Reference Section 3.9; Add Section:

    3.9.4 The superintendent shall organize and coordinate scheduling of the Work and shall review and coordinate Work between the trades/Subcontractors.

23. Reference Section 3.10.2; Delete the last sentence.

24. Reference Section 3.13; Add Sections:

3.13.1 The Contractor shall provide any additional facilities or areas beyond those areas permitted at the site as required for construction operations or storage of materials at no additional cost to the Owner.

3.13.2 The Contractor shall take all necessary precautions to prevent damage to pipes, conduits, and other underground structures. The Contractor shall protect from disturbance or damage all monuments and property marks until an authorized agent of the Owner has witnessed or otherwise referenced their location and the Contractor shall not remove such marks or monuments until directed.

25. Reference Section 3.15; Delete Sections 3.15.1 and 3.15.2 and substitute the following:

3.15.1 The Contractor shall at all times keep the site of the Work and adjacent premises as free from materials, debris, rubbish and trash as practical and shall remove same from any portion of the site and adjacent premises if, in the opinion of the Owner, such materials, debris, rubbish or trash constitute a nuisance or are in any way objectionable to the public The Contractor shall be responsible for the timely removal of dirt accumulations or any other debris on access roads and public streets and highways resulting from the Contractor's operations.

3.15.2 At the completion of the Work, the Contractor shall remove all materials, implements, staging, piling falsework, debris and rubbish connected with or caused by operations for such Work immediately upon completion of that Work and shall leave the premises in perfect condition insofar as affected by the Work under the Contract. Fires for disposal of rubbish on the site are prohibited.

3.15.3 If the Contractor should fail to clean up the premises as provided in the Contract Documents, the Owner, after giving the Contractor forty-eight hours notice, may do so and Owner shall be entitled to reimbursement from the Contractor.

26. Reference Section 3.16; Add Section:

3.16.2 The Contractor shall furnish the Owner and Architect all necessary assistance to facilitate inspections throughout the process of manufacture or construction, or for the examination of any materials entering into the Work, or for any other purpose required in the discharge of the Owner or Architect's duties.

27. Reference Section 3.18; Add Sections:

3.18.3 The obligations of the Contractor under Section 3.18 shall not extend to the liability of the Owner and its consultants, its agents or employees arising out of: (1) the preparation or approval of maps, Drawings, opinions, reports, surveys, Contract Change Orders, designs or specifications, or (2) the giving of or failure to give directions or instructions by the Owner, its agents or employees providing such giving or failure to give directions or instructions is the primary cause of the injury or damage.

3.18.4 The Contract Documents define claims, damage, losses, and expenses as, but do not limit them to: (1) injury or damage consequent upon the failure of or use or misuse by the Contractor, its Subcontractors, agents, servants, or employees, of any hoist, rigging, blocking, scaffolding, or any and all other kinds of items of equipment furnished or loaned by the Owner; (2) all attorneys' fees and costs incurred in defense of the claim or in bringing an action to enforce the provision of this indemnity or any other indemnity contained in the Contract Documents; and (3) all costs, expenses, lost time, opportunity costs, etc., incurred by the party being indemnified or its employees, agents, or consultants.

3.18.5 The indemnification obligations of the Contractor under this Contract does not extend to the liability of the Owner, any Owner's consultants, or their agents, consultants, or employees arising out of their own negligence.

3.18.6 If trade unions perform the Work or any portion of the Work, the Contractor shall make all necessary arrangements to reconcile without delay, damage or cost to the Owner and its consultants, any conflict between the Contract Documents and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities are not included in the work of any particular trade. If this affects the progress of the Work in finishing or installing any items or materials or equipment required under the Contract Documents because of the conflict involving any such agreement or regulation, the Owner or its consultants may require that the Contractor provide other material or equipment of equal kind and quality at no additional cost to the Owner.

REFERENCE ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

28. Reference Section 4.2.2; Add Section:

4.2.2.1 The presence or absence of an Owner's Representative or the Architect on the site for the purpose of inspection shall not relieve the Contractor from any obligations to perform the Work in accordance with the requirements of the Contract Documents.

29. Reference Section 4.2.6:

The Owner will also have the authority to reject Work as provided in Section 2.1.1.3 of these Supplementary Conditions.

REFERENCE ARTICLE 5 - SUBCONTRACTORS

30. Reference Section 5.3; Add Sections:

5.3.1 Such agreements between the Contractor and each Subcontractor (and where appropriate between Subcontractors and Sub-subcontractors) shall also contain provisions that:

.1 require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party, in reasonable time to enable the Contractor to apply for payment in accordance with Article 9;

.2 require that all Claims for additional costs, extensions of time, damages for delays or other claims with respect to subcontracted portions of the Work shall be submitted to the Contractor (via any Subcontractor or Sub-subcontractor where appropriate) in sufficient time so that the Contractor may comply in the manner provided in the Contract Documents for like Claims by the Contractor against the Owner;

.3 waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by property insurance described in Article 11, except such rights as they may have to the proceeds of such insurance held by the Owner as trustee;

.4 inform Subcontractors of their rights under Chapter 573, Code of Iowa; and

.5 obligate each Subcontractor to consent specifically to the provisions of Section 5.2.

5.3.2 In accordance with Section 573.12 of the Code of Iowa, the Contractor will make prompt payments to Subcontractors for satisfactory performance of the Work.

REFERENCE ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

31. Reference Section 6.1.3; Add Section:

6.1.3.1 The Contractor shall be responsible for furnishing accurate information for and participating in the development of a realistic Project schedule.

32. Reference Section 6.2.4; Add Section:

6.2.4.1 Should the Contractor cause damage to the Work or property of any separate contractor or be the cause of delay or failure to perform, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings, and if any judgment or award against the Owner arises therefrom the contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

33. Reference Section 6.2; Add Sections:

6.2.6 Claims and other disputes and matters in question between the Contractor and separate contractors are subject to the provisions of Section 15.3 and 15.4 provided the separate contractor has reciprocal obligations.

6.2.7 The Contractor shall execute all Work in such manner and in such order, or procedure, as will permit the commencement and carrying on of the Work of the Owner and of separate contractors with the least interference possible using a reasonable procedure whenever it is necessary or desirable to execute such work either simultaneously with the Work under Contract, or otherwise. To this end the Contractor shall cooperate and assist the Owner and separate contractors in every reasonable way, and shall interfere as little as possible with their Work. The Contractor shall move, free of charge, the Contractor's plant equipment and materials or any part of same whenever the Owner considers it reasonable and necessary for the work of the Owner or separate contractors.

REFERENCE ARTICLE 7 - CHANGES IN THE WORK

34. Reference Section 7.1.2; Add Section:

7.1.2.1 The Owner's Construction Manager shall also have authority to act alone in issuing an order for a minor change in the Work as provided in Section 2.1.1.5 of these Supplementary Conditions.

35. Reference Section 7.1; Add Sections:

7.1.4 The pricing of changes in the Work which result in an adjustment to the Contract Sum (excepting Alternate Bids, see Section 7.1.5) shall be limited to the Contractor's direct expenses as defined in Sections 7.3.7.1 through 7.3.7.5, plus the applicable percentage of overhead and profit subject to the following limits:

.1 Fifteen percent (15%) maximum mark-up for Work directly performed by employees of the Contractor, Subcontractor, or Sub-subcontractor.

.2 Five percent (5%) maximum Contractor's mark-up for Work performed or passed through by a Subcontractor and passed through to the Owner by the Contractor.

.3 Five percent (5%) maximum Subcontractor's mark-up for Work performed by a Sub-subcontractor and passed through to the Owner by the Subcontractor and Contractor.

.4 The maximum allowable mark-up is twenty-five percent (25%) passed through to the Owner by the Contractor under any circumstances.

7.1.5 The pricing of changes in the Work that add work already bid as an Alternate which have expired, shall adhere to the following guidelines:

.1 Direct material and labor costs associated with the alternate shall be enumerated in the Request for Change and highlight the original cost, the current cost, the difference, and the reason for the difference.

.2 The Contractor may add up to 15% mark-up for the difference between the original direct material and labor costs and the current material and labor costs only.

.3 The contractor may add to the total a 2% mark-up for increased bonds and insurance costs.

7.1.6 Prices shall include all subcontracts and shall be itemized as follows:

.1 Labor costs shall indicate trade, hourly rate, man hours, and total costs.

.2 Materials, supplies and equipment costs shall indicate unit cost, quantity, and total cost for each item.

.3 Machinery and equipment costs shall indicate machinery or equipment type, number of each, hourly rate, and total cost for each item.

7.1.7 The Contractor shall be allowed no additional compensation for any costs, fees or expenses incurred in performing services already required by the Contract for Construction, and shall not be entitled to additional reimbursement for its home office, other non-job site or indirect overhead expenses, or tools necessary for construction.

7.1.8 Any request for time extension as a result of the Change in Work must be justified and presented in adequate detail showing that the proposed change will delay the final Contract completion date.

7.1.9 Contractor shall not apply sales, consumer, use and similar tax charges incurred for material purchases in charges toward the overhead and profit percentage.

7.1.10 The following definitions shall be used in establishing process for Changes in Work:

.1 Direct expense is the Contractor's actual cost of any item that is easily defined as a required item for the completion of his Contract obligation.

.2 Overhead is a business expense created by the Project but not necessarily a direct part of that portion of the Work involved.

.3 Profit is the compensation accruing to the Contractor for the assumption of risk in a business enterprise.

36. Reference Section 7.2.1; Delete Section and substitute the following:

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

37. Reference Section 7.4; Add Section:

7.4.1 The Owner's Construction Manager shall also have authority to issue an order for a minor change in the Work as provided in Section 2.1.1.5 of these Supplementary Conditions.

REFERENCE ARTICLE 8 - TIME

38. Reference Section 8.2; Add Section:

8.2.4 In the event the Contractor fails to maintain the schedule, including accepted revisions, the Contractor shall promptly, at no additional cost to the Owner, increase work forces, increase hours, and/or initiate revisions to means and methods of construction as required to make up lost time and complete the Work in accordance with the construction schedule.

REFERENCE ARTICLE 9 - PAYMENTS AND COMPLETION

39. Reference Section 9.3.1; Add the following sentence to Section 9.3.1:

    The Form of Application for Payment shall be a current authorized edition of AIA Document G702 – 1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703 – 1992, Continuation Sheet. One copy of each Application for Payment shall be submitted electronically in .pdf format via email to the Architect or, if applicable, uploaded to the project website for each progress payment.

40. Reference Section 9.3.1; Add Sections:

    9.3.1.3 Applications for Payment shall be submitted once a month.

    9.3.1.4 The Owner will withhold until final payment, retainage in an amount consistent with the provisions of Section 573.12, 573.13, and 573.14 of the Code of Iowa.

41. Reference Section 9.5.1; Add Section:

    9.5.1.8 third party claims filed pursuant to Chapter 573 of the Iowa Code.

42. Reference Section 9.5.3; Delete section in its entirety.

43. Reference Section 9.6.4; Delete the first two sentences.

44. Reference Section 9.8.5; Delete the second sentence and substitute the following:

    Upon such acceptance and consent of surety, if any, the Owner shall make payment sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work and unsettled claims.

45. Reference Section 9.10.1; Add Section:

    9.10.1.1 Issuance of a letter of Final Acceptance by the Owner shall establish the commencement of the thirty-day period during which the Owner retains final payment of the balance due under the Contract under Iowa law and per provisions of this Agreement. If at the end of such thirty-day period, claims are on file with the Owner, the Owner will withhold a sum equal to double the total amount of claims on file or five percent (5%) of the Contract price, whichever is less, until such claims are released or otherwise adjudicated. The Owner will issue a letter of Final Acceptance to the Contractor upon receipt of the Final Certificate for Payment from the Architect.

46. Reference Section 9.10.2; Add Sections:

    9.10.2.1 The Owner will not make final payment until the Contractor has performed final cleanup in accordance with Section 3.15

    9.10.2.2 See Division 1 – General Requirements for items to be submitted with the final Application for Payment. The Architect will not issue a final Certificate of Payment until all items indicated are submitted:

REFERENCE ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

47. Reference Section 10.1; Add Sections:

    10.1.1 Accident Prevention: The safety provisions of all applicable laws, building and construction codes shall be observed. Machinery, equipment and all hazards shall be guarded or eliminated in accordance with the safety provisions of the latest edition of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.

10.1.2 The Work shall be governed by applicable provisions of the general law, including the latest amendments of the following:

1. William-Steiger Occupational Safety & Health Act of 1970, Public Law 91-596.
2. Part 1910 – Occupational Safety & Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
3. Part 1518 –Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

10.1.3 The Contractor is responsible for conducting a safety program and/or precautions on the project site that assures work on the site is conducted in accordance with all guidelines and requirements of OSHA and other applicable laws, building and construction codes, and sound construction practice. The Contractor shall prepare, implement and enforce a project safety plan for the purpose of maintaining a site where work is conducted in a safe manner. A copy of the safety plan shall be maintained on the site at all times.

48. Reference Section 10.2; Add Sections:

10.2.9 The Contractor must comply with provisions of Section 88.6(1) of the Code of Iowa pertaining to Occupational Safety and Health Administration (OSHA) entrance and inspections which states that the State Labor Commissioner or State Labor Commissioner's representative upon presenting appropriate credentials to the Owner, operator, or agent in charge, is authorized:

.1 To enter without delay and at reasonable times a factory, plant, establishment, construction site, or other area, work place, or environment where work is performed by an employee of an employer; and

.2 To inspect and investigate during regular working hours and other reasonable times, and within reasonable limits, and within a reasonable manner, any such place of employment and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials therein, and to question privately any such owner, operator, agent, or employer.

49. Reference Section 10.3.1; Add Section:

10.3.1.1 The Contractor is not required pursuant to Article 7 to perform without consent any work relating to asbestos or polychlorinated biphenyl (PCB).

50. Reference Section 10.3; Add Sections:

10.3.7 Lamps, bulbs and ballasts indicated to be removed by the Contractor, and not indicated to be reused on the project, can be salvaged by the Owner or the Contractor. If not salvaged, the Contractor shall pay any required fees and ensure proper disposal as universal waste (ballasts labeled as "PCB Free" can be disposed as solid waste).

10.3.8 All self-luminous or photo-luminescent (radioactive tritium) exit signs shown to be removed by the Contractor shall be removed without damage and turned over to the Owner for disposal.

10.3.9 The Contractor shall not use asbestos-containing products or materials. Requests for exceptions shall be forwarded by the Contractor to the Owner for approval by the Environmental Branch of the Directorate of Installation Management.

10.3.10 The Contractor shall not knowingly remove, damage or disturb asbestos-containing materials unless required by the project's plans and specifications. Any asbestos abatement identified in the Contract Documents as the responsibility of the Contractor must be performed by properly trained and certified personnel in accordance with all environmental and worker safety regulations.

51. Reference Section 10.3.1; Add Section:

10.3.1.1 The Contractor is not required pursuant to Article 7 to perform without consent any work relating to asbestos or polychlorinated biphenyl (PCB).

52. Reference Article 10; Add Sections:

10.5 IOWA HAZARDOUS CHEMICAL RISKS RIGHT TO KNOW LAW:

10.5.1 Owner's Responsibility. Upon request, the Owner will provide to the Contractor a list of known hazardous chemicals within the Project Site to which their employees may be exposed and suggestions for appropriate protective measures.

10.5.2 Contractor's Responsibility. Contractor must inform his/her employees of the Iowa Hazardous Chemical Risks Right to Know Law.

10.5.3 The Contractor must provide to the Owner a list of known hazardous chemicals that they anticipate using on site as well as other pertinent information relating to employee protection. Contractor's Material Safety Data Sheets (MSDS) must be available to the Owner upon request.

10.7 POLLUTION PREVENTION PROCEDURES

10.7.1 The following pollution prevention procedures shall apply to all Contractors working on Iowa Army National Guard projects:

.1 Spill Prevention and Response: The Contractor shall take adequate precautions to prevent spills of hazardous chemicals, oils, and fuels. The Contractor shall have procedures in place to immediately clean up all spills that could occur on the job site or during transportation to and from the job site. Expenses incurred in the spill cleanup shall belong to the Contractor. Specifically:

.a When liquid hazardous chemicals, oils, or fuels are stored on the job site, the contractor shall provide secondary containment, for containers with 55 gallon capacity or greater, equal to or greater than 110% of the volume of the single largest container.

.b The Contractor shall notify the Iowa Army National Guard Environmental Branch in the event of a spill of chemicals, oils or fuels. The Contractor must have sufficient resources on the work site to clean up a spill. All workers at the site shall know whom the Contractor point of contact is and what they are to do in the event of a spill.

.c The point of contact for the Environmental Branch is:

Shannan Garretson, Environmental Program Manager
Building 3535 (B-61), Camp Dodge
7105 NW 70th Avenue
Johnston, Iowa 50131-1824
Phone: (515) 252-4557
Non-duty Hours Cell Phone (515) 249-5847

.d The Contractor must notify the Iowa Department of Natural Resources and the local sheriff's office of a hazardous substance spill that meets the definition of a "hazardous condition" as defined in the Iowa Administrative Code. Iowa law requires reporting as soon as possible but not later than six hours. Spills meeting the criteria of a "reportable spill" will also require notification of the National Response Center.

10.7.4 Storm Water Pollution Prevention Plans and Permits:

.1 A Storm Water Pollution Prevention Plan and a discharge permit will be required for construction activities resulting in one acre or more soil disturbance.

.2 The Iowa Army National Guard's Director of Installation Management Environmental Branch shall obtain the permit.

.3 The General Contractor, and each subcontractor that has a responsibility described in the plan, will be a co-permittee with the Owner. The General Contractor shall be responsible for compliance with and fulfilling all requirements of the NPDES General Permit Number 2, including the Storm Water Pollution Prevention Plan.

.4 The initial Storm Water Pollution Prevention Plan and Notice of Intent will be provided by the Owner. These and the General Contractor's project inspection diary must be kept on-site and presented to federal, state and local environmental regulatory personnel, and the Owner, when requested.

.5 The General Contractor will provide an individual experienced with storm water pollution prevention plans and techniques to conduct weekly and rainfall inspections of the construction site and review the project's Storm Water Pollution Prevention Plan at the time of each inspection. The General Contractor is responsible for maintaining a copy of each inspection report. The General Contractor will review the weekly and rainfall storm water inspection reports and address any deficiencies within seven days. Deficiencies may also be identified by the Owner at any time. Corrective actions may include installation of additional erosion controls and/or maintenance of existing controls.

.6 If the Contractor should fail to conduct inspections, create reports, maintain the project inspection diary, and address deficiencies, the Owner, after giving the Contractor forty-eight hours notice, may do so and the Owner shall be entitled to reimbursement from the Contractor.

The General Contractor shall be responsible for continuing compliance with all SWPPP requirements until final stabilization is achieved regardless of whether Substantial Completion has been granted or the Owner has occupied any portion of the site or facility. Such practices shall include, but not be limited to, inspections and reports and maintenance of erosion control measures as described above.

.7 The Owner will file a Notice of Discontinuation upon final stabilization of the disturbed area. The General Contractor will provide the original project inspection diary and the marked-up copy of the Storm Water Pollution Prevention Plan to the Owner at the completion of the project.

10.7.5 Removal of Regulated Wastes:

.1 At the completion of the construction project, the Contractor will be required to remove all waste and unused hazardous chemicals including, but not limited to: solvents, adhesives, paints, and fuels. Said materials shall be properly identified, containerized and, if no longer usable, disposed at the Contractor's expense.

REFERENCE ARTICLE 11- INSURANCE AND BONDS

53. Reference Section 11.1; Add Sections:

11.1.5 Insurance: No prime Contractor shall commence work under this contract until he/she has obtained all insurance required under this Section and until such insurance has been approved by the Owner, nor his/her sub-contractor until all similar insurance required of the subcontractor has been obtained and approved. No policy of insurance which is cancelable on less than 30 days written notice to the insured is satisfactory to the Owner's Representative.

11.1.6 Compensation and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of this Contract the Statutory Workmen's Compensation and Employer's Liability Insurance for all of his/her employees to be engaged in work on the project under this Contract, and in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work.

11.1.7 Bodily Injury Liability and Property Damage Liability Insurance: Each prime Contractor shall take out and maintain during the life of the Contract such Bodily Injury Liability and Property

Damage Liability Insurance as shall protect him/her and any subcontractor performing work covered by the Contract from claims for damage for personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under this Contract, whether such operations be by him/herself or by any subcontractor or by anyone directly or indirectly employed by either of them and the amount of such insurance shall be no less than:

.1 Public Liability Insurance, in an amount no less than Five Hundred Thousand Dollars ($500,000.00), for injuries including wrongful death to any one person, and subject to the same limit for each person in any amount not less than One Million Dollars ($1,000,000.00) on account of one accident.

.2 Property Damage Insurance, in a minimum amount of One Million Dollars ($1,000,000.00) for damages on account of all accidents other than automobile property damage accidents.

.3 Motor Vehicle Bodily Injury Liability in a minimum amount of Five Hundred Thousand Dollars ($500,000.00), per occupant and One Million Dollars ($1,000,000.00) per accident on account of any one automobile accident."

11.1.8 Insurance Certificates: Each prime Contractor shall furnish certificates of insurance listed above to the Owner and they shall also be subject to the Owner's approval for adequacy of protection."

11.1.9 Owner's Protective Liability Insurance: Each prime Contractor shall take out and furnish to the Owner and maintain during the life of this Contract, complete Owner's Protective Liability Insurance in amounts as specified in Section 11.1.7 above, for Bodily Injury Liability Insurance and for Property Damage Liability Insurance."

11.1.10 All insurance coverage must be provided by insurance companies having policy holder ratings no lower than "A" and financial ratings not lower than "XII" in the Best's Insurance Guide, latest edition in effect as of the date of the Contract.

11.1.11 The required limits of liability may be met by using a split-limit or a combined single limit basis. However, the total limit of liability cannot be less than that stated in the requirements.

54. Reference Section 11.3; The Contractor is directed to purchase and maintain Builder's Risk insurance. Modify Section 11.3 and subsections as follows:

    a. Modify the first sentence of Section 11.3.1 as follows: Delete "Unless otherwise provided, the Owner" and substitute "The Contractor". Add the following sentence:

       If the Owner is damaged by the failure of the Contractor to purchase and maintain such insurance without so notifying the Owner in writing, then the Contractor shall bear all reasonable costs attributable thereto.

    b. Delete Section 11.3.1.2.

    c. Modify Section 11.3.1.3 by substituting "Contractor" for "Owner".

    d. Modify Section 11.3.2 by substituting "Contractor" for "Owner" at the first reference to "Owner.

    e. Delete Section 11.3.4.

    f. Modify Section 11.3.6 by making the following substitutions: (1) in the first sentence, substitute "Contractor" for "Owner" and "Owner" for "Contractor", and (2) substitute "Owner" for "Contractor" at the end of the last sentence.

    g. Modify Section 11.3.7 by substituting "Contractor" for "Owner" at the end of the first sentence.

h. Modify Section 11.3.8 by substituting “Contractor” for “Owner”; each time the latter word appears except that at the first reference to “Owner” in the first sentence, the word “this” should be substituted for “the Owner’s”.

i. Modify Section 11.3.9 by substituting “Contractor” for “Owner” each time the latter word appears except at the third occurrence in the third sentence and in the last sentence.

j. Modify Section 11.3.10 by substituting “Contractor” for “Owner” each time the latter word appears except at the third occurrence in the first sentence and in the first occurrence in the last sentence.

55. Reference Section 11.4; Delete Section 11.4.1 and substitute the following:

11.4.1 The Contractor shall furnish bonds on the date of execution of the Contract covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Bidding Requirements or specifically required in the Contract Documents. The bond shall be on the form prescribed in the Bidding Requirements and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to one hundred percent (100%) of the Contract Sum.

.1 The Contractor shall deliver the required bonds to the Owner simultaneously with the delivery of the executed Contract.

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

56. Reference Section 11.4; Add Section:

11.4.3 If any surety upon any bond furnished in connection with this Contract becomes unacceptable to the State, or if any such surety fails to furnish reports as to their financial condition from time to time as additional security as may be required from time to time to protect the interests of the State or of persons supplying labor or materials in the prosecution of the Work contemplated by the Contract, the State may terminate the Contract.

REFERENCE ARTICLE 12- UNCOVERING AND CORRECTION OF WORK

57. Reference Section 12.1.2; Add Section:

12.1.2.1 If the condition noted in Section 12.1.2 above was caused by a separate contractor, the Contractor shall first attempt to reach settlement with the separate contractor as provided in Article 6.

58. Reference Section 12.2.2; Add the following sentence to Section 12.2.2.1:

The obligations of the Contractor under this Section shall survive termination of the Contract.

59. Reference Section 12.2.2; Add Sections:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct and the Contractor shall attend a meeting with the Owner to review the facility operations and performance.

12.2.2.5 If it becomes necessary for the Contractor to replace an item after Substantial Completion under the terms of the Contract Documents, the warranty period of time for the replacement shall begin with the date of the completion of the replacement.

12.2.2.6 If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice, the Owner may remove it and store the salvageable materials or equipment at the Contractor’s expense. If the Contractor does not pay costs of such removal and storage within ten (10) days after written notice, the Owner may, upon ten (10) additional days written notice, sell such materials and equipment and account for the proceeds

thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation of the Owner's services and expenses made necessary by this action. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum will be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor must pay the difference to the Owner.

REFERENCE ARTICLE 13 - MISCELLANEOUS PROVISIONS

60. Reference Section 13.1; Delete the words following "…where the Project is located".

61. Reference Section 13.5.1; Add Section:

13.5.1.1 Special Inspections, if required for this Project by the Contract Documents, will be procured and paid for by the Owner. The duties and responsibilities of the Contractor in regard to Special Inspections shall be as defined in the General Requirements of the Contract Documents. Special Inspections, if required, are separate and distinct from other Tests and Inspections required by the Contract Documents which shall be procured and paid for by the Contractor under the provisions of Section 13.5.

62. Reference Section 13.6; Delete Section 13.6 and substitute the following:

13.6 INTEREST: Payments due and unpaid under the Contract Documents shall bear interest in accordance with Section 573.12 and 573.14 of the Code of Iowa.

63. Reference Section 13.7; Delete Section in its entirety and substitute the following:

13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

13.7.1 As between the Owner and Contractor:

.1 Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

.2 Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and

.3 After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any Warranty provided under Section 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Section 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

64. Reference Article 13; Add Sections:

13.8 ENERGY REBATE FORM(S)

13.8.1 The Contractor shall obtain Energy Rebate Forms from all applicable utility providers for the Work. The Contractor shall partially complete and sign the rebate forms; providing the information identified below. The Contractor shall submit the rebate forms with the Application for Final Payment as directed in Article 9.

<u>Lighting</u>:

1. List brand name & model number of fixture(s).

2. List number of fixtures installed.
3. Provide a copy of invoice(s) from supplier to Contractor.
4. Provide Contractor signature.
5. Note: Owner will provide remaining information such as account number, age and size of facility, hours of operation, etc.

HVAC:

1. List manufacturer, size, efficiency, model number, serial number, and installed cost of unit(s). Include manufacturer, model, and installed cost of programmable thermostats.
2. Provide a copy of invoice(s) from the Supplier to Contractor.
3. Provide Contractor signature.
4. Note: Owner will provide remaining information such as account number, age and size of facility, hours of operation, etc.

Motors:

1. List variable speed drive information including manufacturer, model number, serial number, rating, efficiency, equipment cost, and installation cost.
2. List NEMA Premium motor information including manufacturer, model number, serial number, HP rating, efficiency, motor speed, and motor and installation cost.
3. Provide a copy of invoice(s) from the Supplier to Contractor.
4. Provide Contractor signature.
5. Note: Owner will provide remaining information such as account number, age and size of facility, hours of operation, etc.

13.9 MANUFACTURER'S DIRECTIONS

13.9.1 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer unless herein specified to the contrary.

13.9.2 Any additional costs incurred as a result of this requirement shall be borne by the Contractor.

13.10 CODE OF FAIR PRACTICES

13.10.1 During the performance of this Contract, the Contractor agrees as follows:

.1 The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, religion, national origin, sex, age, or physical or mental disability, or status as a Vietnam-era disabled veteran. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, religion, national origin, sex, age, physical or mental disability, or status as a Vietnam-era disabled veteran except where it relates to a bona fide occupational qualification. Such action includes but is not limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or terminations, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices provided by the Owner setting forth provisions of the nondiscrimination clause.

.2 The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, religion, national origin, sex, age, physical or mental disability, or status as a Vietnam-era disabled veteran except where it relates to a bona fide occupational qualification.

.3 The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Contractor's commitments under this

nondiscrimination clause and post copies of the notice in conspicuous places available to employees and applicants for employment.

.4 The Contractor will comply with all relevant provisions of the Iowa Civil Rights Act of 1965, as amended by Iowa Executive order #15 of 1973, as amended by Iowa Executive Order #34 of 1988; Federal Executive Order 11246 of 1965, as amended by Federal Executive Order 11375 of 1967; the Equal Employment Opportunity Act of 1972; and all provisions relevant to fair application of the rules and regulations of the Owner. The Contractor will furnish all information and reports requested by the Owner or required by or pursuant to the rules and regulations thereof and will also permit access to its payroll and employment records by the Owner or representatives for purposes of investigation to ascertain compliance with such rules, regulations, or requests, or with this nondiscrimination clause.

.5 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the aforesaid rules, regulations, or requests, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further contracts with the Owner. In addition, the Owner may take such further action, and such other sanctions may be imposed and remedies invoked, as provided by the Iowa Civil Rights Act of 1965 as amended, Chapter 601A, Code of Iowa, as heretofore and hereafter amended, or by the rules and regulations of the Owner or as otherwise provided by law.

.6 The Contractor will include the provisions of this section of Article 13 hereof in every subcontract and purchase order unless specifically exempt by approval of the Owner, in accordance with the rules and regulations, so that such provisions will be binding on each Subcontractor and vendor. The Contractor will take such action with respect to any Subcontractor or purchase order as the Owner or the authorized representative thereof may direct as a means of enforcing such provisions including sanctions for noncompliance; provided however, that in the event the Contractor becomes involved in, or is threatened with, litigation by a Subcontractor or vendor as a result of such direction by the Owner, the Contractor may request the State of Iowa to enter into such litigation to protect the interests of the State of Iowa.

REFERENCE ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

65. Reference Section 14.3; Add Section:

14.3.3 Adjustments made for increases in the cost may have a mutually agreed fixed or percentage fee.

66. Reference Section 14.4; Delete Section 14.4.3 and substitute the following:

14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive from the Owner, payment for Work executed and for proven loss with respect to material, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit. The Contractor shall transfer title to Owner and deliver in the time, place and manner as directed by the Owner, all fabricated and unfabricated parts, Work-in-process, completed Work, supplies and other materials produced as part of, or acquired in connection with the discontinued Work, and other property which would have been required to be furnished to Owner if the Contract had been completed.

67. Reference Article 14; Add Section:

14.5 MISCELLANEOUS TERMINATION

14.5.1 Funding: If the Bidding Requirements indicate Federal funding for this project is received from the Federal Government prior to award of the Contract and such Federal funding is not received within the sixty (60) day bid guarantee after the date of receiving bids, all rights and obligations to enter into a Contract are considered null and void.

14.5.2 Provisions of law as contained in Chapter 573A of the Code of Iowa, current edition (which pertains to termination of contracts for construction of public improvements when Work thereon is stopped because of a national emergency), applies to and is a part of this Contract and binding upon all parties hereto, including Subcontractors and sureties.

REFERENCE ARTICLE 15 – CLAIMS AND DISPUTES

68. Reference Section 15.1.5.1; Add Section:

15.1.5.1.a The Contractor shall not be entitled to an increase in the Contract Sum as a result of any delays in the progress of the Work. The Contractor's sole remedy for delay is an extension of time, extended by Change Order for such reasonable time as proposed by the Contractor and approved by the Owner.

END OF DOCUMENT 00 73 00

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Work performed by Owner.
   4. Contractor's use of site and premises.
   5. Coordination with occupants.
   6. Work restrictions.
   7. Specification and Drawing conventions.

1.2 PROJECT INFORMATION

A. Project Identification: Iowa Army National Ottumwa Maintenance Building Renovation.
   1. Project Location: Ottumwa, Iowa.

B. Owner: Department of Public Defense, Building W41 Camp Dodge, 7105 NW 70th Avenue, Johnston, Iowa 50131-1824.

C. Architect: RDG Planning & Design, 301 Grand Avenue, Des Moines, Iowa 50309.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
   1. The general scope of Work includes:
      a. Creating additional locker room space to hold the new total of double-wide lockers for the unit.
      b. Creating a new paved concrete access road into the military compound on the south side of the armory.
      c. Constructing a new vehicle maintenance training bay in the north end of the existing military vehicle storage building (MVSB).
      d. Constructing a new storage bay with caged storage units, in the south end of the existing military vehicle storage building (MVSB).
      e. Creating 13 additional paved spaces in the privately-owned vehicle (POV) space. The current layout has 94 spaces, and they are authorized 107 spaces.
      f. Modifying the layout of the existing military-owned parking fencing.

B. Type of Contract:
   1. Project will be constructed under a single prime contract.

C. Commencement of Work On-Site: To be coordinated with the Owner.

D. Project Completion: To be coordinated with the Owner.

1.4 WORK PERFORMED BY OWNER

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

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for 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.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to between 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise approved in advance by Owner.

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 arranging for temporary utility services according to requirements indicated:
   1. Notify Owner not less than three 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 three days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Owner's property is not permitted.

F. Employee Identification: All personnel working on project site will be required to present a government issued ID to access the building.

G. Employee Screening: Comply with Owner's requirements for COVID screening upon entry into the building.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
   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 to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use form provided in Project Manual.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
      b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitutions 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 as well as 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 Contractor's construction schedule using proposed substitutions 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.

3. 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.

1.4 QUALITY ASSURANCE

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

1.5 PROCEDURES

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

1.6 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on 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. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
      a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      b. Substitution request is fully documented and properly submitted.
      c. Requested substitution will not adversely affect Contractor's construction schedule.
      d. Requested substitution has received necessary approvals of authorities having jurisdiction.
      e. Requested substitution is compatible with other portions of the Work.
      f. Requested substitution has been coordinated with other portions of the Work.
      g. Requested substitution provides specified warranty.
      h. 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:
   1. Not allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SUBSTITUTION REQUEST FORM

To: RDG Planning & Design

Project: Iowa ARNG Ottumwa Maintenance Building Reno.
Ottumwa, Iowa

Project No.: R3006.106.00 Date Received: _____

Specification Section Number and Paragraphs: _____

Drawings and Details Affected: _____

Proposed Substitution: _____

Manufacturer: _____

Product (Model, Pattern, etc.): _____

WHY IS SUBSTITUTION BEING SUBMITTED? *(Select One of the Following)*

(____) Voluntary Alternate
(____) Specified Product is Not Available – Explain
(____) Cost Savings to Owner – Indicate Comparative Cost Analysis
(____) Other – Explain

EFFECTS OF PROPOSED SUBSTITUTION *(Answer the Following Questions and Attach Explanations)*

Does substitution affect dimensions indicated on the Drawings?
(NO) (YES, explain)

Does substitution affect work of other sections?
(NO) (YES, explain)

Does substitution require modifications to design, change to Drawings, or revisions to specifications to be incorporated into the project?
(NO) (YES, explain)

Attach list of at least three projects where proposed substitution has been used within past 12 months. Include name, address, and telephone number of Owner and Architect.

CONTRACTOR'S / BIDDER'S REPRESENTATION
Undersigned accepts responsibility for coordination of proposed substitution and accepts all additional costs resulting from the incorporation of proposed substitution into the project per Division 01 Section "Substitution Procedures."

SUBMITTED BY:

_____

_____

_____

For Architect's Use:
Accepted (___) Not Accepted (___)
No Action Required (___)
Submission: Incomplete (___) Too Late (___)
Reviewed By/Date: _____
Comments: _____

Subcontractor's Signature and Date: _____

Contractor's Signature and Date: _____

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 SUBMITTAL PROCEDURES

A. Prepare proposal requests as PDF electronic files and upload to web-based Project software website specifically established for project. Enter required data in web-based software site to fully identify submittal.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

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. 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 20 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.
      e. Quotation Form: Use forms acceptable to Architect.

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 taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. Include costs of labor and supervision directly attributable to the change.
   5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.
8. Submit or post proposal requests using Portable Data File (PDF) format.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 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. RFIs.
   3. Digital project management procedures.
   4. Project meetings.

1.2 DEFINITIONS

A. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 SUBMITTAL PROCEDURES

A. Prepare submittals and other documents required by this Section as PDF electronic files and upload to web-based Project software website specifically established for project. Enter required data in web-based software site to fully identify submittal.

1.4 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, telephone number, and email address 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: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office. Keep list current at all times.

1.5 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. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. 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.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner 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. Owner name.
3. Project number.
4. Date.
5. Name of Contractor.
6. Name of Architect.
7. RFI number, numbered sequentially.
8. RFI subject.
9. Specification Section number and title and related paragraphs, as appropriate.
10. Drawing number and detail references, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. 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: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond.
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. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Contractor shall promptly respond. Architect's response may be withheld until additional contractor information is provided.
3. Architect's action on RFIs does not authorize a change to the Contract Time or the Contract Sum,
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response and submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
   b. No change to the Contract Documents impacting cost or time shall proceed unless directed by a fully executed contract change document.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement included in Project Manualfollowing this section.
   a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

B. Web-Based Project Management Software Package: Use web-based Project site, Submittal Exchange, for purposes of managing Project during construction phase. Reference Section 01 33 05 “Electronic Submittal Procedures” for procedural requirements.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
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. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner Architect, 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. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long lead items.
    e. Designation of key personnel and their duties.
    f. Lines of communications.
    g. Use of web-based Project software.
    h. Procedures for processing field decisions and Change Orders.
    i. Procedures for RFIs.
    j. Procedures for testing and inspecting.
    k. Procedures for processing Applications for Payment.
    l. Distribution of executed Agreement, bonds and insurance certificates.
    m. Distribution of the Contract Documents.
    n. Submittal procedures.
    o. Preparation of Record Documents.
    p. Use of the premises and existing building.
    q. Work restrictions.
    r. Working hours.
    s. Owner's occupancy requirements.
    t. Responsibility for temporary facilities and controls.
    u. Procedures for moisture and mold control.
    v. Procedures for disruptions and shutdowns.
    w. Construction waste management and recycling.
    x. Parking availability.
    y. Office, work, and storage areas.
    z. Equipment deliveries and priorities.
    aa. First aid.
    bb. Security.
    cc. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    a. Contract Documents.
    b. Options.

c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the 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.
1) Review schedule for next period.
b. Review present and future needs of each entity present, including the following:
1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site use.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.

11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of Proposal Requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) 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.

E. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
   1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
      c. Review present and future needs of each contractor present, including the following:
         1) Interface requirements.
         2) Sequence of operations.
         3) Status of submittals.
         4) Deliveries.
         5) Off-site fabrication.
         6) Access.
         7) Site use.
         8) Temporary facilities and controls.
         9) Work hours.
         10) Hazards and risks.
         11) Progress cleaning.
         12) Quality and work standards.
         13) Status of RFIs.
         14) Proposal Requests.
         15) Change Orders.
         16) Pending changes.
   3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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AIA® Document C106™ – 2022

Digital Data Licensing Agreement

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

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address, and contact information, including electronic addresses)

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

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address, and contact information, including electronic addresses)

for the following Project:
(Name and location or address of the Project)

for the following Digital Data ("Digital Data"):
(Identify below, in detail, the information created or stored in digital form that the Parties intend to be subject to this Agreement.)

The Transmitting Party and Receiving Party agree as follows.

TABLE OF ARTICLES

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the Parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the Parties.

§ 1.3 Confidential Digital Data is Digital Data containing confidential or business proprietary information that the Transmitting Party designates as "confidential."

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data solely and exclusively for the uses, and in accordance with the terms, set forth in Article 3.

§ 2.2 Only the Receiving Party is permitted to access and use the Digital Data. Unlicensed and unauthorized access or use by third parties is strictly prohibited except as set forth in Section 2.4.1.

§ 2.3 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.4 Where the Transmitting Party has designated information furnished pursuant to this Agreement as "confidential," the Receiving Party shall keep the information confidential and shall not disclose it to any other person or entity except as set forth in Section 2.4.1.

§ 2.4.1 The Receiving Party may disclose Confidential Digital Data after seven (7) days' notice to the Transmitting Party 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 Receiving Party may also disclose Confidential Digital Data 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.

§ 2.5 By transmitting Digital Data, the Transmitting Party does not convey any ownership right in the Digital Data or in the software used to generate the Digital Data. Unless otherwise granted in a separate license, the Receiving Party's right to use, modify, or further transmit Digital Data is specifically limited to those uses, and in accordance with the terms, set forth in Article 3, and nothing contained in this Agreement conveys any other right to use the Digital Data.

§ 2.6 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

§ 2.7 Transmission of the Digital Data does not abridge or extinguish the Transmitting Party's rights, including, to the extent applicable, exclusive ownership interest, in such information under all applicable state, federal, and international laws including, without limitation, laws governing the protection of copyrights and intellectual property.

§ 2.8 The provisions of this Article 2 shall survive the termination of this Agreement.

ARTICLE 3 LICENSE CONDITIONS

§ 3.1 The Receiving Party may use and rely upon the Digital Data to the extent set forth in this Article 3.
(Choose only one option below.)

☐ **§ 3.1.1** The Digital Data is transmitted solely for the Receiving Party's information. Receiving Party acknowledges that any use of the Digital Data shall be at Receiving Party's sole risk. The Receiving Party accepts the Digital Data "as is" without any warranty or representations from the Transmitting Party as to whether the Digital Data is accurate, complete, or fit for use as intended by the Receiving Party. The Receiving Party is solely responsible for verifying whether the Digital Data is accurate, complete, or fit for the Receiving Party's intended use.

☐ **§ 3.1.2** Other:
(Identify terms, permitted uses, or other conditions related to the Digital Data.)

§ 3.2 If no specific terms or uses are selected or set forth in Section 3.1, then the Receiving Party may use the Digital Data at its sole risk pursuant to the terms and conditions set forth in Section 3.1.1.

ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation for the Receiving Party's use of the Digital Data:
(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

This Agreement is entered into as of the day and year first written above and terminates one year from said date, except as set forth below.
(Indicate when this Agreement will terminate, if other than one year from the date it was entered into, and other conditions related to termination.)

TRANSMITTING PARTY *(Signature)*	**RECEIVING PARTY** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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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. Contractor's Construction Schedule.
   2. Site condition reports.
   3. Unusual event reports.

1.2 SUBMITTALS PROCEDURES

A. Prepare construction schedules, site condition reports, and special reports as PDF electronic files and upload to web-based Project software website specifically established for project. Enter required data in web-based software site to fully identify submittal.

1.3 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
   1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:.
   1. Temporary Facilities: Indicate start and completion dates for the following as applicable:
      a. Securing of approvals and permits required for performance of the Work.
      b. Temporary facilities.
      c. Construction of mock-ups, prototypes and samples.
      d. Owner interfaces and furnishing of items.
      e. Regulatory agency approvals.
      f. Contractor’s punch list.
      g. Owner’s/Architect’s punch list.
   2. Long Lead-Time Procurement Activities: Include procurement process activities for the following long lead-time 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 indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
   4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not more than 30 days 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.

1. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Mockups. Indicate dates for completion of all mock-ups and the review time to obtain approval. Do not begin work represented by the mock-up until the mock-up is approved. List as part of the critical path for the work.

D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

E. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week 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.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days 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, equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.5 GANTT-CHART SCHEDULE REQUIREMENTS

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 14 days of date established for commencement of the Work.

C. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1.6 REPORTS

A. 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.

B. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
   1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect'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."

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
   2. Submit concurrently with the first complete submittal of Contractor's construction schedule.
      a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
   3. Format: Arrange the following information in a tabular format:
      a. Scheduled date for first submittal.
      b. Specification Section number and title.
      c. Submittal Category: Action; informational.
      d. Name of subcontractor.
      e. Description of the Work covered.
      f. Scheduled date for Architect's final release or approval.
      g. Scheduled dates for purchasing.
      h. Scheduled date of fabrication.
      i. Scheduled dates for installation.
      j. Activity or event number.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
   1. Project name.
   2. Date.
   3. Name of Architect.
   4. Name of Contractor.
   5. Name of firm or entity that prepared submittal.
   6. Names of subcontractor, manufacturer, and supplier.
   7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
   8. Category and type of submittal.

9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
1. PDF Documentation Format: Unrestricted, searchable, read-only, Portable Document Format (PDF) that allows printing, copying or extracting content, and the addition of markups using Adobe Acrobat, Bluebeam Revu, or similar PDF reading and editing software.
2. Electronically convert paper documents using Optical Character Recognition (OCR) software if needed to comply with specified documentation format properties.
3. 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.
4. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000-001).
   b. Resubmittals shall include an alphabetic suffix (e.g., 061000-001a).

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
2. Shop drawings and product data submittals shall be transmitted to Architect/Engineer in electronic (PDF) format using Submittal Exchange, a website service designed specifically for transmitting submittals between construction team members.
3. Electronic submittal process is not intended for color samples, color charts, or physical material samples.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
   a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. 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 Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams that show factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

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 unless submittal based on Architect's digital data drawing files is otherwise permitted.
   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.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
a. Project name and submittal number.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Drawing designation or Specification paragraph number and generic name of each item.
3. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
a. Submit separate paper copy of transmittal and physical Samples to Architect.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Retain one returned Sample set as a project record Sample.
1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:
   1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
   2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
   3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
   4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
   5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
   6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:
   1. 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 substrate preparation and primers required.
   2. 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.
   3. 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.
   4. 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.
   5. 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.
   6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
      a. Name of evaluation organization.
      b. Date of evaluation.
      c. Time period when report is in effect.
      d. Product and manufacturers' names.
      e. Description of product.
      f. Test procedures and results.
      g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.
   1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 ARCHITECT'S REVIEW

A. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required, and return.
   1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review or discard submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 33 05 – ELECTRONIC SUBMITTAL PROCEDURES (IA ARNG)

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Sections and Documents:
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
   2. Division 00 – Bidding and Contract Requirements issued by the Contracting Officer, apply to this Section.
   3. Division 01 Section "Submittal Procedures" for general submittal requirements.

1.2 SUBMITTALS

A. Website provider operation and access instructions.

PART 2 - PRODUCTS

2.1 PROJECT WEBSITE SERVICE PROVIDER:

A. Website Service Provider: Subject to compliance with requirements, provide products and/or service under their current licensing agreements by one of the following website service providers:
   1. “Submittal Exchange” (www.submittalexchange.com) (800-714-0024).
   2. Equal website service provider pre-approved prior to Bid Date. (See Document 00 43 25 Supplement F – Substitution Request Form (Bidding Phase).

B. Website Service shall have the following capabilities:
   1. Independently hosted, web-based system designed specifically for transmitting submittals and other construction communications between all project team members. FTP site and e-mail exchanges are not acceptable.
   2. Utilize SSL encryption and hosted at SAS70 Type II compliant data centers.
   3. Minimum four years documented experience of use on comparable commercial construction projects.
   4. Unlimited individual user accounts and system access for all project subcontractors, general contractor, owner, design consultants, and subconsultants.
   5. Capability to log and organize by tab an unlimited number of electronic submittals with no file size limitations.
   6. Separate locations for owner, design consultant, and subconsultant review comments with contractors restricted from viewing comments until final review or release by owner or primary design consultant.
   7. Automatic customized company-specific PDF review and transmittal forms setup as required for owner, design consultants, subconsultants, and general contractor.
   8. Full version histories and dates of exchanges automatically tracked and available for viewing, searching, and reporting in a linear log format compatible with AIA G712.
   9. Automatic, configurable email notifications for each project team member for new and reviewed submittals and other items.
   10. Automatic, configurable email reminders of past due items.

11. Prior to project start, system vendor shall create submittal log with all required items from project manual. Owner or primary design consultant shall have full control over required items list and access to edit, add, or remove items during project.
12. Training shall be provided to general contractor, owner, design consultants, and subconsultants after Notice to Proceed but prior to start of construction.
13. Training sessions for subcontractors shall be provided minimum of twice weekly throughout project.
14. Allowance for scanning and printing services provided by local third-party reprographic vendor to assist with obtaining documents electronically and online print ordering.
15. At completion of project closeout, make available for download an electronic archive of all documents and tracking logs. Electronic archive shall emulate the online project website in organization and operation.

2.2 MINIMUM INTERNET SERVICE AND EQUIPMENT REQUIREMENTS

A. Email address and internet service at Contractor's main office(s).

B. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), NitroPDF (www.nitropdf.com) or other similar PDF review software for applying electronic stamps, mark-ups, and comments.

2.3 COSTS AND DURATION

A. General Contractor shall obtain and pay for the website service subscription. (The cost for the service shall be included in the Contractor's Base Bid. Contact the website service provider prior to submitting Bid to obtain pricing).
   1. The minimum duration of the website service subscription shall extend **6 months** beyond the Contractor's anticipated Date of Substantial Completion.

PART 3 - EXECUTION

3.1 PROCEDURES

A. General Contractor's project management team and subcontractors shall attend training sessions with the Owner, Design Consultants, and website provider on the use of the project website prior to uploading any submittals.

B. Contractor shall not alter the layout or function of the project website.

C. Electronic Submittals shall be transmitted to the Architect in electronic (PDF) format via a website service designed specifically for transmitting electronic submittals between construction team members.

D. The intent of electronic submittals is to:
   1. Reduce paperwork and shipping costs.
   2. Improve and expedite information flow.
   3. Decrease turnaround time.
   4. Provide the Owner with an electronic archive of submittals at project completion.

E. Contractor shall be responsible for coordinating with the website service provider for training of their employees, sub-contractors, and suppliers in the use of the website service and PDF submittals.

F. The following items, at a minimum, shall be electronic submittals and shall be uploaded under the appropriate “tab” on the project website (where applicable, these submittals will be uploaded by the Owner or Design Consultant):
   1. Project Team Directory.
   2. Shop Drawings.
   3. Product Data.
   4. Transmittals for Samples delivered.
   5. Informational Submittals.
   6. Closeout Submittals.
   7. Substantial Completion Documents
   8. Supplemental Instructions (SI’s).
   9. Change Directives (CD’s).
   10. Requests for Information (RFI’s).
   11. Requests for Change (RFC’s) and Requests for Proposal (RFP’s).
   12. Meeting Minutes.
   13. Schedules.
   14. Photos.
   15. Reports.
   16. Tests and Inspections.
   17. Punch lists.

G. Submittal Preparation: Contractor may use any or all of the following options:
   1. Subcontractors and Suppliers provide electronic (PDF) submittals to General Contractor via uploading to the website service.
   2. Subcontractors and Suppliers provide electronic (PDF) submittals to General Contractor via email and General Contractor uploads submittals to the website service.
   3. Subcontractors and Suppliers provide paper copy submittals to General Contractor. General Contractor scans submittals to convert to PDF format, and uploads submittals to website service.
   4. Subcontractors and Suppliers provide paper copy submittals to Scanning Service. Scanning Service scans submittals to convert to PDF format. Subcontractors and Suppliers uploads submittals to the website service or forwards to General Contractor for uploading.

H. Submittal Format:
   1. All submittals shall be uploaded in “PDF” format. Reduce pdf file size before uploading whenever feasible.
   2. For all submittals larger than 11” x 17”, Contractor shall submit two (2) full-size paper copy to Architect for reference only (paper copy will not be returned) in addition to the electronic submittal.

I. Shop Drawing and Product Data Submittal Procedures:
   1. General Contractor shall review submittals, add review comments, and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
   2. General Contractor shall create an electronic transmittal for each submittal, attach to submittal in PDF format, and upload submittal to website.
   3. Architect (and/or Sub-Consultant if applicable) shall review submittal, add review comments, apply electronic stamp indicating status of submittal, and upload reviewed submittal to website. General Contractor will receive email notice of completed review.
   4. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the General Contractor.
   5. Re-submittals, if required, shall be uploaded to the website service under the same procedures as described above.

3.2 NON-ELECTRONIC SUBMITTALS:

A. The following items shall be hard-copy submittals:
   1. Color Samples, Actual Color Charts, Physical Material Samples
      a. Upload a transmittal form to the project website for review and tracking purposes.
   2. Applications for Payment.
   3. Change Orders.
      a. Upload a pdf copy to the project website upon approval of change order.

END OF SECTION 01 33 05

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, 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.

B. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

C. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction.. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
   1. Mockups are used for one or more of the following:
      a. Verify selections made under Sample submittals.
      b. Demonstrate aesthetic effects.
      c. Demonstrate the qualities of products and workmanship.
      d. Demonstrate successful installation of interfaces between components and systems.
      e. Perform preconstruction testing to determine system performance.
   2. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

1.3 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements 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 clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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.

1.4 SUBMITTALS REQUIREMENTS

A. Prepare submittals and reports as PDF electronic files and upload to web-based Project software website specifically established for project. Enter required data in web-based software site to fully identify submittal.

1.5 INFORMATIONAL SUBMITTALS

A. Reports: Prepare and submit certified written reports and documents as specified.

B. Permits, Licenses, and Certificates: For Owner's record, 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.

1.6 REPORTS AND DOCUMENTS

A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, telephone number, and email address of technical 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 of whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

B. 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, telephone number, and email address 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 of whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

1.7 QUALITY ASSURANCE

A. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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, applying, 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 is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
   1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Manufacturer's Technical 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.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups of size indicated.
   2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
   3. Notify Architect 14 days in advance of dates and times when mockups will be constructed.
   4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
   5. Demonstrate the proposed range of aesthetic effects and workmanship.
   6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
   7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
   8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   10. Demolish and remove mockups when directed unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, 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.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

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.

1.2 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.
   1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

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.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations, List: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; (see FGIA).
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; www.concrete.org.
9. ACP - American Clean Power; (Formerly: American Wind Energy Association); www.cleanpower.org.
10. ACPA - American Concrete Pipe Association; www.concretepipe.org.
11. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
12. AF&PA - American Forest & Paper Association; www.afandpa.org.
13. AGA - American Gas Association; www.aga.org.
14. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
16. AI - Asphalt Institute; www.asphaltinstitute.org.
17. AIA - American Institute of Architects (The); www.aia.org.
18. AISC - American Institute of Steel Construction; www.aisc.org.
19. AISI - American Iron and Steel Institute; www.steel.org.
20. AITC - American Institute of Timber Construction; (see PLIB).
21. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
22. AMPP - Association for Materials Protection and Performance; www.ampp.org.
23. ANSI - American National Standards Institute; www.ansi.org.
24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); www.analyzeseeds.com.
25. APA - APA - The Engineered Wood Association; www.apawood.org.
26. APA - Architectural Precast Association; www.archprecast.org.
27. API - American Petroleum Institute; www.api.org.
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASA - Acoustical Society of America; www.acousticalsociety.org.
30. ASCE - American Society of Civil Engineers; www.asce.org.
31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
33. ASME - ASME International; American Society of Mechanical Engineers (The); www.asme.org.
34. ASSE - ASSE International; (American Society of Sanitary Engineering); www.asse-plumbing.org.
35. ASSP - American Society of Safety Professionals; www.assp.org.
36. ASTM - ASTM International; www.astm.org.
37. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
38. AVIXA - Audiovisual and Integrated Experience Association; www.avixa.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.

43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - Business and Institutional Furniture Manufacturer's Association; www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BSI - British Standards Institution; www.bsigroup.com.
50. BWF - Badminton World Federation; www.bwfbadminton.com.
51. CARB - California Air Resources Board; www.arb.ca.gov.
52. CDA - Copper Development Association Inc.; www.copper.org.
53. CE - Conformite Europeenne (European Commission); www.ec.europa.eu/growth/single-market/ce-marking.
54. CEA - Canadian Electricity Association; www.electricity.ca.
55. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
56. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
57. CGA - Compressed Gas Association; www.cganet.com.
58. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
59. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
60. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
61. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
62. CMHA - Concrete Masonry & Hardscape Association; (Formerly: National Concrete Masonry Association); www.masonryandhardscapes.org.
63. CPA - Composite Panel Association; www.compositepanel.org.
64. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
65. CRRC - Cool Roof Rating Council; www.coolroofs.org.
66. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
67. CSA - CSA Group; www.csagroup.org.
68. CSI - Cast Stone Institute; www.caststone.org.
69. CSI - Construction Specifications Institute (The); www.csiresources.org.
70. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
71. CTA - Consumer Technology Association; www.cta.tech.
72. CTI - Cooling Technology Institute; www.coolingtechnology.org.
73. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
74. DHA - Decorative Hardwoods Association; www.decorativehardwoods.org.
75. DHI - Door and Hardware Institute; www.dhi.org.
76. ECIA - Electronic Components Industry Association; www.ecianow.org.
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD - EOS/ESD Association, Inc.; Electrostatic Discharge Association; www.esda.org.
80. ESTA - Entertainment Services and Technology Association; www.esta.org.
81. EVO - Efficiency Valuation Organization; www.evo-world.org.
82. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
83. FGIA - Fenestration and Glazing Industry Alliance; https://fgiaonline.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
87. FM Global - FM Global; www.fmglobal.com.
88. FRSA - Florida Roofing and Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GS - Green Seal; www.greenseal.org.
93. HI - Hydraulic Institute; www.pumps.org.
94. HMMA - Hollow Metal Manufacturers Association; (see NAAMM).
95. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.

96. IAS - International Accreditation Service; www.iasonline.org.
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Association (The); www.theicpa.com.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE SA - IEEE Standards Association; https://standards.ieee.org.
103. IES - Illuminating Engineering Society; www.ies.org.
104. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
105. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
106. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
107. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
108. Intertek - Intertek Group; www.intertek.com.
109. ISA - International Society of Automation (The); www.isa.org.
110. ISFA - International Surface Fabricators Association; www.isfanow.org.
111. ISO - International Organization for Standardization; www.iso.org.
112. ITU - International Telecommunication Union; www.itu.int.
113. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
114. LPI - Lightning Protection Institute; www.lightning.org.
115. MBMA - Metal Building Manufacturers Association; www.mbma.com.
116. MCA - Metal Construction Association; www.metalconstruction.org.
117. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
118. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
119. MHI - Material Handling Industry; www.mhi.org.
120. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
121. MPI - Master Painters Institute; www.paintinfo.com.
122. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.; www.msshq.org.
123. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
124. NACE - NACE International; (National Association of Corrosion Engineers International); (see AMPP).
125. NADCA - National Air Duct Cleaners Association; www.nadca.com.
126. NAIMA - North American Insulation Manufacturers Association; www.insulationinstitute.org.
127. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
128. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
129. NBI - New Buildings Institute; www.newbuildings.org.
130. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
131. NCMA - National Concrete Masonry Association; (see CMHA).
132. NEBB - National Environmental Balancing Bureau; www.nebb.org.
133. NECA - National Electrical Contractors Association; www.necanet.org.
134. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
135. NEMA - National Electrical Manufacturers Association; www.nema.org.
136. NETA - InterNational Electrical Testing Association; www.netaworld.org.
137. NFHS - National Federation of State High School Associations; www.nfhs.org.
138. NFPA - National Fire Protection Association; www.nfpa.org.
139. NFPA - NFPA International; (see NFPA).
140. NFRC - National Fenestration Rating Council; www.nfrc.org.
141. NGA - National Glass Association; www.glass.org.
142. NHLA - National Hardwood Lumber Association; www.nhla.com.
143. NLGA - National Lumber Grades Authority; www.nlga.org.
144. NOFMA - National Oak Flooring Manufacturers Association; (see NWFA).
145. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
146. NRCA - National Roofing Contractors Association; www.nrca.net.
147. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
148. NSF - NSF International; www.nsf.org.
149. NSI - Natural Stone Institute; www.naturalstoneinstitute.org.
150. NSPE - National Society of Professional Engineers; www.nspe.org.

151. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
152. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
153. NWFA - National Wood Flooring Association; www.nwfa.org.
154. NWRA - National Waste & Recycling Association; www.wasterecycling.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; www.plasa.org.
158. PLIB - Pacific Lumber Inspection Bureau; www.plib.org.
159. PVCPA - Uni-Bell PVC Pipe Association; www.uni-bell.org.
160. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
161. RFCI - Resilient Floor Covering Institute; www.rfci.com.
162. RIS - Redwood Inspection Service; (see WWPA).
163. SAE - SAE International; www.sae.org.
164. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
165. SDI - Steel Deck Institute; www.sdi.org.
166. SDI - Steel Door Institute; www.steeldoor.org.
167. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
168. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (see ASCE).
169. SIA - Security Industry Association; www.securityindustry.org.
170. SJI - Steel Joist Institute; www.steeljoist.org.
171. SMA - Screen Manufacturers Association; www.smainfo.org.
172. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
173. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
174. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
175. SPIB - Southern Pine Inspection Bureau; www.spib.org.
176. SPRI - Single Ply Roofing Industry; www.spri.org.
177. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
178. SSINA - Specialty Steel Industry of North America; www.ssina.com.
179. SSPC - SSPC: The Society for Protective Coatings; (see AMPP).
180. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; www.steeltank.com.
181. SWI - Steel Window Institute; www.steelwindows.com.
182. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
183. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
184. TCNA - Tile Council of North America, Inc.; www.tcnatile.com.
185. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.kbcdco.tema.org.
186. TIA - Telecommunications Industry Association; www.tiaonline.org.
187. TMS - The Masonry Society; www.masonrysociety.org.
188. TPI - Truss Plate Institute; www.tpinst.org.
189. TPI - Turfgrass Producers International; www.turfgrasssod.org.
190. TRI - Tile Roofing Industry Alliance; www.tileroofing.org.
191. ULSE - UL Standards & Engagement Inc.; www.ulse.org.
192. UL - UL Solutions Inc.; www.ul.com.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WA - Wallcoverings Association; www.wallcoverings.org.
197. WCLIB - West Coast Lumber Inspection Bureau; (see PLIB).
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; www.woodworkinstitute.com.
201. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
202. WWPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
   1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.

2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. CPSC - U.S. Consumer Product Safety Commission; www.cpsc.gov.
2. DOC - U.S. Department of Commerce; www.commerce.gov.
3. DOD - U.S. Department of Defense; www.defense.gov.
4. DOE - U.S. Department of Energy; www.energy.gov.
5. DOJ - U.S. Department of Justice; www.ojp.usdoj.gov
6. DOS - U.S. Department of State; www.state.gov.
7. EPA - United States Environmental Protection Agency; www.epa.gov.
8. FAA - Federal Aviation Administration; www.faa.gov.
9. GPO - U.S. Government Publishing Office; www.gpo.gov.
10. GSA - U.S. General Services Administration; www.gsa.gov.
11. HUD - U.S. Department of Housing and Urban Development; www.hud.gov.
12. LBNL - Lawrence Berkeley National Laboratory; Energy Technologies Area; www.lbl.gov/.
13. NIST - National Institute of Standards and Technology; www.nist.gov.
14. OSHA - Occupational Safety & Health Administration; www.osha.gov.
15. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
16. USACE - U.S. Army Corps of Engineers; www.usace.army.mil.
17. USDA - U.S. Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
18. USDA - U.S. Department of Agriculture; Rural Utilities Service; www.usda.gov.
19. USP - U.S. Pharmacopeial Convention; www.usp.org.
20. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from U.S. Government Publishing Office; www.govinfo.gov.
2. DOD - U.S. Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
3. DSCC - Defense Supply Center Columbus; (see FS).
4. FED-STD - Federal Standard; (see FS).
5. FS - Federal Specification; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from U.S. General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specifications and Standards; (see DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (see USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. BEARHFTI; California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; (see BHGS).

2. BHGS; State of California Bureau of Household Goods and Services; (Formerly: California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation); www.bhgs.dca.ca.gov.
3. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.oal.ca.gov/publications/ccr/.
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/Main-Page.aspx.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; https://tfsweb.tamu.edu/.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. Installation, removal, and use charges for temporary facilities to be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer 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.

C. 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.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.2 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.

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.

3.3 TEMPORARY UTILITY INSTALLATION

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

B. Sanitary Facilities:
   1. Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner.
   2. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Electric Power Service:
   1. Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

D. Telephone Service: Provide superintendent with cellular telephone.

3.4 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

B. Waste Disposal Facilities:
   1. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
   2. Provide waste-collection containers in sizes adequate to handle waste from construction operations.

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

3.5 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. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

D. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

3.6 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.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor.
   2. 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."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of This 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.

1.2 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products unless otherwise indicated.
   3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
   1. Evaluating Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product.
   1. Comply with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."

F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.

1.3 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. Resolution of Compatibility Disputes between Multiple Contractors:
      a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
      b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products will be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
   1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is inconspicuous.
   2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
      a. Name of product and manufacturer.
      b. Model and serial number.
      c. Capacity.
      d. Speed.
      e. Ratings.
   3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.4 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. 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.
   3. 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.
   4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:
   1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
   2. Store products to allow for inspection and measurement of quantity or counting of units.
   3. Store materials in a manner that will not endanger Project structure.
   4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections are to 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other 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 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 meeting 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 Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by Architect, whose determination is final.

B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements.
    a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
    a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
    a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
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 may additionally 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.
    a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect'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 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
3. Detailed comparison of significant qualities of proposed product with those of the named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
4. Evidence that proposed product provides specified warranty.
5. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
6. Samples, if requested.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation.

1. Submittal Procedures: Comply with Section 01 33 00 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Submittal Requirements:
1. Approval by Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements in individual Specification Sections.
2. When approved in advance by Architect, other submittal requirements specified in individual Specification Sections may be combined with comparable product submittal. Approval by Architect of comparable product submittal and of other submittal requirements will satisfy product's submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
   1. Installation.
   2. Cutting and patching.
   3. Progress cleaning.
   4. Starting and adjusting.
   5. Protection of installed construction.
   6. Correction of the Work.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 QUALITY ASSURANCE

A. 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, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements 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.
   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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. 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 Architect for the visual and functional performance of in-place materials.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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 local utility 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 Contractor, submit a request for information to Architect in accordance with requirements in Section 01 31 00 "Project Management and Coordination."

3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb, and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
   4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces, unless otherwise indicated on Drawings.

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 satisfactory results as judged by Architect. 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 of type expected for Project.

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: Where possible, select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.
   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, as judged by Architect. Fit exposed connections together to form hairline joints.

3.4 CUTTING AND PATCHING

A. 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. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 10 00 "Summary."

F. 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.

G. 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.
   4. Excavating and Backfilling: Comply with requirements in applicable 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.

H. 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, as judged by Architect. 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 eliminate 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, corner to corner of wall and edge to edge of ceiling. 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.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. 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, in accordance with regulations.
    a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

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 in accordance with 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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 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 Section 01 40 00 "Quality Requirements."

3.7 CORRECTION OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
   2. Where damaged or worn items cannot be repaired or restored, provide replacements.
   3. Remove and replace operating components that cannot be repaired.
   4. Restore damaged construction and permanent facilities used during construction to specified condition.

C. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

D. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   1. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

E. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

F. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

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SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL (IA ARNG)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:
   1. Section 02 41 19 “Selective Demolition” for disposition of waste resulting from partial demolition of buildings, structures, and site improvement.

1.2 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 demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Divert: Redirection of demolition or construction waste from disposal in landfills to alternate destinations for recycle, salvage, or reuse.

E. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

G. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve minimum end-of-Project rate for salvage/recycling of 60 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including, but not limited to, the following:
   1. Demolition Waste:
      a. Asphalt paving.
      b. Concrete.
      c. Concrete reinforcing steel.
      d. Brick.
      e. Concrete masonry units.
      f. Wood studs.
      g. Wood joists.

h. Plywood and oriented strand board.
i. Wood paneling.
j. Wood trim.
k. Structural and miscellaneous steel.
l. Rough hardware.
m. Roofing.
n. Insulation.
o. Doors and frames.
p. Door hardware.
q. Windows.
r. Glazing.
s. Metal studs.
t. Gypsum board.
u. Acoustical tile and panels.
v. Carpet.
w. Carpet pad.
x. Demountable partitions.
y. Equipment.
z. Cabinets.
aa. Plumbing fixtures.
bb. Piping.
cc. Supports and hangers.
dd. Valves.
ee. Sprinklers.
ff. Mechanical equipment.
gg. Refrigerants.
hh. Electrical conduit.
ii. Copper wiring.
jj. Lighting fixtures.
kk. Lamps.
ll. Ballasts.
mm. Electrical devices.
nn. Switchgear and panelboards.
oo. Transformers.
pp. Site-clearing waste.

2. Construction Waste:
   a. Concrete
   b. Masonry and CMU.
   c. Lumber.
   d. Wood sheet materials.
   e. Wood trim.
   f. Metals.
   g. Roofing.
   h. Insulation.
   i. Carpet and pad.
   j. Gypsum board.
   k. Piping.
   l. Electrical conduit.
   m. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle **100 percent** of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.

5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

B. Methods of trash/waste disposal that are not acceptable are:
1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.

C. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, State, and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 10 days of date established for the Notice to Proceed or prior to commencement of any work, whichever comes first.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Reports: Reports shall be created using Owner's "Waste Reduction Report Template." Print reports to pdf prior to submission. Include scans of all related invoices/weight tickets with each report.
1. Progress Reports: Submit an updated report monthly. Submit concurrently with Applications for Payment. Failure to submit report may delay payment. Upload reports to the Project website. Include the following information:
a. Total quantity of construction waste in tons.
b. Total quantity of diverted waste in tons (itemized by material type).
1) If containers taken to a recycling facility contain co-mingled waste to be sorted by the recycler, use the current recovery rate for their facility for each drop-off date when calculating actual diverted waste quantities for reporting. For example, if the facility's recovery rate is 75.8%, and 20 tons of co-mingled waste is dropped off, even though it may be 100% recyclable, only 75.87% of it can be reported (15.16 tons). Verify the facility's current recovery rate for the month in which each drop-off was made.
c. Total percentage of construction waste diverted from landfill.
d. Landfill Disposal:
1) Identification of material.
2) Amount of waste material disposed of in landfills in tons. List weights for each individual haul and calculated total weight on each updated report.
3) Identity of the landfill, hauler, date of haul, and ticket number.
e. Recycled and Salvaged Material:
1) Identification of material, including material retrieved by installer for use on other projects or for return to manufacturer for recycling.
2) Amount of waste material recycled or salvaged in tons. List weights for each individual haul and calculated total weight on each updated report.
3) Identity of the receiving party, hauler, date of haul, and ticket number.
4) Certification by receiving party that materials will not be disposed of in landfills or by incineration.
f. Material Reused on Project:
1) Identification of material and how it was reused on the Project.
2) Amount of waste material reused in tons. List weights for each material and calculated total weight on each updated report.
3) Include weight tickets or calculations as evidence of quantities.

g. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

2. Final Report: At completion of Project, upload a Final Report to the Project website.

1.6 WASTE MANAGEMENT PLAN

A. Develop a waste management plan to include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of.
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills using reuse, salvage, or recycling. Include list of local receivers and processors and type of material each will accept. Include names, addresses, and telephone numbers.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Materials Handling and Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
   6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e., whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

B. The following sources may be useful in developing the Waste Management Plan:
   1. Phoenix C&D Recycling, www.phoenixrecycling.net, creynolds@phoenixrecycling.net, 4764 NE 22nd St, Des Moines, Iowa, (515) 323-5888.
   2. Alter Trading Corporation, https://www.altertrading.com/locations/8, 1810 E. Hull Ave., Des Moines, IA 50313, (515) 262-0764.
   3. Hallett Material, www.hallettmaterials.com, jsinclair@hallettmaterials.com, 4764 NE 22nd St, Des Moines, Iowa. (515) 266-9928.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. Coordinator: Designate an on-site waste management coordinator responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to the job site foreman, each subcontractor, the Owner, and the Owner's Project Architect.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures as appropriate for the work:
   1. Distribute and review the Waste Management Plan with each entity when they first begin work on-site. Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse and return methods to be used by all parties at the appropriate stages of the project.
   2. Provide follow-up training for each entity as needed to maintain compliance with the plan.

D. Meetings:

1. Review the Waste Management Plan at the Pre-Construction Meeting. Discuss responsibilities of each involved party and goals for the project. Revise and resubmit the plan as agreed to at the meeting.
2. Include waste management and recycling discussion in pre-installation meetings.
3. Include waste management and recycling as an agenda item in all progress meetings with the Owner and job safety meetings with the subcontractors.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
1. As a minimum, provide:
   a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
   b. Separate dumpsters for each category of recyclable.
   c. Recycling bins at worker lunch areas.
2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes in accordance with applicable regulations.

G. Transportation: Arrange for timely pickups from the site or deliveries to approved facilities of trash/waste material to keep construction site clear and prevent contamination of materials. Keep copies of delivery and pickup receipts for reporting.

3.2 SALVAGING DEMOLITION and construction WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for sale and donation not permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store and protect items from damage in a secure area until pick-up by Owner.
4. Notify Owner when items are ready for pick-up.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

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

3.4 RECYCLING DEMOLITION WASTE

A. Land Clearing Debris: Collect wood debris from land clearing separate from large amounts of dirt and other non-wood materials and transport to recycling facility.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete and Masonry: Free of metals including reinforcing, wood, and other contaminants. Process by one of the following means:
1. If allowed by specifications, during demolition, crush concrete and concrete masonry to aggregate size. Store crushed material on-site in a clean area to avoid contamination from other materials or building processes. Re-use on site crushed material for fill, for stabilizing soils, or as base and sub-base materials.
2. If crushing on-site is impractical, store material during demolition processes on site in a clean, uncontaminated area and transport concrete and masonry materials to a certified concrete recycler.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials. Reuse on-site as appropriate or transport to recycling facility.

E. Metals: Cut as required to fit into containers.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

I. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

J. Carpet (and pad): Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
1. Store clean, dry carpet (and pad) in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

M. Conduit: Reduce conduit to straight lengths and store by type and size.

N. Packaging:
1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill 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.

END OF SECTION 01 74 19

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 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. Submittal of Project warranties.
   4. Final cleaning.

1.2 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, and similar final record information.
   2. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number.
   3. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Complete startup and testing of systems and equipment.
   3. Complete repair and restoration operations required by Division 01 Section “Execution.”
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   7. Complete final cleaning requirements.
   8. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine 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. 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.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
   1. Submit a final Application for Payment.
   2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   3. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
   4. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine final completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 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,, listed by room or space number.
   2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:
      a. PDF Electronic File: Architect will return annotated file.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties prior to requesting final inspection.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranties in Paper Form:
   1. Bind warranties and bonds in heavy-duty, three-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.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: 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 designated 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 not planted, mulched, or 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. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
      g. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
      h. Vacuum and mop concrete.
      i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
      j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
      k. Remove labels that are not permanent.

l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Product maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit one paper copy.
   2. Submit one PDF copy equivalent to the paper copy.

1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.4 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set of marked-up record prints.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an acceptable drawing technique.
      c. Record data as soon as possible after obtaining it.
      d. Record and check the markup before enclosing concealed installations.
      e. Cross-reference record prints to corresponding photographic documentation.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Revisions to routing of piping and conduits.
      d. Revisions to electrical circuitry.
      e. Actual equipment locations.
      f. Locations of concealed internal utilities.
      g. Changes made by Change Order or Construction Change Directive.
      h. Changes made following Architect's written orders.
      i. Details not on the original Contract Drawings.
      j. Field records for variable and concealed conditions.
      k. Record information on the Work that is shown only schematically.
   3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
   4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
   5. Mark important additional information that was either shown schematically or omitted from original Drawings.
   6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
   1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   2. Format: Annotated PDF electronic file with comment function enabled.
   3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   4. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation "PROJECT RECORD DRAWINGS."
      d. Name of Architect.
      e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification where applicable.

1.5 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders[**, Record Specifications,**] and Record Drawings where applicable.

1.6 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section Includes:
   1. Demolition and removal of selected portions of exterior or interior of building or structure and site elements.
   2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage; prepare for reuse; and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review and finalize selective demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   4. Review areas where existing construction is to remain and requires protection.

1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials:
   1. It is not expected that hazardous materials will be encountered in the Work.

a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. On-site sale of removed items or materials is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey of Existing Conditions: Correlate with requirements indicated to determine extent of selective demolition required.

B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 01 50 00 "Temporary Facilities and Controls."

B. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
3. Cover and protect furniture, furnishings, and equipment that have not been removed.

3.3 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
4. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Floor Coverings: Do not use methods requiring solvent-based adhesive strippers.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Steel framing and supports for overhead doors.
   2. Steel tube reinforcement for low partitions.
   3. Steel framing and supports for mechanical and electrical equipment.
   4. Miscellaneous steel trim including steel angle corner guards and steel edgings.
   5. Metal bollards.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Fasteners.
   2. Shop primers.
   3. Shrinkage-resisting grout.
   4. Slotted channel framing.
   5. Metal bollards.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel framing and supports for overhead doors.
   2. Steel tube reinforcement for low partitions.
   3. Steel framing and supports for mechanical and electrical equipment.
   4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   5. Metal bollards.

1.4 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

D. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ISO 898-1, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.

C. Post-Installed Anchors: Torque-controlled expansion anchors.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 09 Section “Paints and Coatings.”

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.
3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.6 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime miscellaneous steel trim.

D. Prime miscellaneous steel trim with zinc-rich primer.

2.7 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.

B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.
   1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel or stainless steel pipe with 1/4-inch- (6.4-mm-) thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) larger than OD of bollard.

D. Fabricate internal sleeves for removable bollards from Schedule 80 steel pipe or 1/4-inch (6.4-mm) wall-thickness steel tubing with an OD approximately 1/16 inch (1.5 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4-inch (19-mm) steel machine bolt.

E. Prime steel bollards with zinc-rich primer.

2.8 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with universal shop primer indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

2.10 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

3.3 INSTALLATION OF METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
   1. Do not fill removable bollards with concrete.

B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.
   1. Embed anchor bolts at least 4 inches (100 mm) in concrete.

C. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches (1050 mm) deep and 3/4 inch (19 mm) larger than OD of bollard. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

D. Fill bollards solidly with concrete, mounding top surface to shed water.
   1. Do not fill removable bollards with concrete.

3.4 REPAIRS

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
      a. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
   2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section “Paints and Coatings.”

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood products.
   2. Wood-preservative-treated lumber.
   3. Fire-retardant-treated lumber.
   4. Miscellaneous lumber.
   5. Plywood backing panels.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
   3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:
   1. 15 percent for 2-inch nominal thickness or less.
   2. 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
   1. Treatment is not to promote corrosion of metal fasteners.
   2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
   3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

E. Application: Treat items indicated on Drawings, and the following:
   1. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Furring.
   4. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
   1. Hem-fir (north); NLGA.
   2. Mixed southern pine or southern pine; SPIB.
   3. Spruce-pine-fir; NLGA.
   4. Hem-fir; WCLIB or WWPA.
   5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

G. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

C. Do not splice structural members between supports unless otherwise indicated.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

G. Use screw or bolt fasteners unless otherwise indicated. Make tight connections between members. Install fasteners without splitting wood. Slightly countersink fastener heads, unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

END OF SECTION 06 10 00

SECTION 07 21 16 – BLANKET LINER INSULATION FOR METAL BUILDINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermal insulation and moisture control system for metal buildings for the following applications:
      a. Walls.
      b. Roofing, with OSHA compliant, leading edge fall protection.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C991 - Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
   2. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
   3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   4. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure A).

B. North American Insulation Manufacturers Association (NAIMA):
   1. NAIMA 202-96(R) (Rev. 2000) STANDARD For Flexible Fiberglass Insulation to be Laminated for Use in Metal Buildings.

C. National Fire Protection Association (NFPA):
   1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratories (UL):
   1. UL 723 - Test for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Insulation R-Value of 30 for installed roof system.
   2. Insulation R-Value of 19 for installed wall system.
   3. The installed roof and wall systems shall provide a continuous vapor barrier.

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's data for each of the following including:
   1. Roof installation instructions.
   2. Wall installation instructions.
   3. Product data sheet.
   4. Design considerations guide.
   5. Recycle content certification for fiberglass insulation products – minimum 50% recycled content for all fiberglass insulation materials.

B. Shop Drawings: Provide shop drawings that indicate the following:
   1. Liner fabric layout.

2. Insulation Layout and cut list.
3. Customer and project information.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Companies shall be familiar with the installation practices associated with banded liner systems.

1.6 SAFETY PRECAUTIONS

A. Installation contractor must have a site-specific safety plan and comply with all OSHA applicable local rules and regulations when installing this system.

B. Workers must use OSHA required fall protection when installing banding and fabric system at heights (see OSHA regulations at 29 CFR 1926, Subpart M).

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products indoors or in a dry, covered area. Do not open products until ready to use.

B. Protect products from potential construction site damage. Use care when opening products as pallets may shift during shipment.

C. Banding has sharp edges. Wear cut proof gloves when handling. Wear safety glasses when unpacking materials.

1.8 PROJECT CONDITIONS

A. For best results, do not install this system outside of the temperature, humidity, ventilation and environmental limits recommended by the manufacturer. Products should be kept covered and dry at temperatures less than 100 degrees F prior to installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Basis of Design: ProLiner™ Banded Liner System as supplied by Therm-All, 31387 Industrial Parkway, North Olmsted, OH 44070; Toll Free Tel: 800-886-9494; Fax: 440-734-1001; Email: WBeals@therm-all.com; www.therm-all.com.
   1. Components:
      a. Polyethylene vapor retarder liner fabric in white color.
      b. Galvanized metal support straps (bands) painted to match liner fabric.
      c. EcoTouch Certified R metal building insulation in one layer.
   2. Metal Building Insulation:
      a. Complies with ASTM C991 Type 1.
      b. Complies with NAIMA 202-96-REV 2000.
      c. Surface Burning Characteristics: Flame Spread Index less than 25 and Smoke Developed Index less than 50 when tested in accordance with ASTM E84, NFPA 255 and UL 723.
      d. Certified by SCS Global Services to contain a minimum of 65 percent recycled glass content, 18 percent pre-consumer and 47 percent post-consumer.
      e. Thermal Resistance, R-Value: 19 at walls, 30 at Roof.
      f. Unfaced.

B. Fabric liner facing/vapor barrier composed of woven high-density polyethylene coated on both sides with polyethylene. Complies with the following:
   1. Color: White
   2. ASTM C1136, Types I through Type VI. Type I-IV exception for dimensional stability (value is less than 2.0 percent).
   3. Perm Rating: Maximum 0.02 when tested in accordance with ASTM E 96 Procedure A.
   4. Surface Burning Characteristics: Flame Spread Index of 0 and Smoke Developed Index less than 50 when tested in accordance with ASTM E 84.
   5. Vapor Barrier Adhesive: Application temperature of 0 to 110 degrees F.
   6. Double Sided Vapor Barrier Tape: Width 0.75 to 1.5 inches, rubber or acrylic base.
   7. Patch Tape: Adhesive added to one side; installation temperature of 10 to 110 degrees F, width: 3 inches.
   8. Metal Banding/ Straps: Coated steel, width 1.0 inch, structural steel Grade 50 per ASTM C 653, exposed color to match vapor barrier, gray backing color.
   9. Thermal Breaks:
      a. Closed cell vinyl foam tape for wall applications:
         1) Thickness: 0.125 to 0.375 inches.
         2) Width: 3.0 inches.
      b. Thermal spacer blocks:
         1) Extruded or expanded polystyrene.
         2) Thickness: 0.5 to 1.0 inches.
         3) Minimum width: 3.0 inches.
   10. Light Gage Steel Fasteners:
      a. Material: Zinc plated, cold forged steel.
      b. Head color to match vapor barrier.
      c. Contain rubber sealing washer.
   11. Heavy Gage Steel Fasteners:
      a. Material: Zinc plated, cold forged steel.
      b. Head color to match vapor barrier.
   12. Insulation Hangers: Insul-hold insulation hangers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which work of this section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify structure, bracing, and concealed building systems have been tested and inspected.

B. Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install liner system in accordance with manufacturer's installation instructions and approved Shop Drawings.

B. Purlin and girt attachment surfaces should be clean and dry prior to attaching two-faced tape or sealing adhesive.

C. Installed fiberglass insulation should fit snugly against purlin and girt walls in the cavity space. Avoid gaps, voids and any excess compression.

3.3 CLEANING

A. Clean dirt from vapor barrier fabric using a soft cloth with soap and water or non-abrasive household cleaner. Solvent-based cleaners and abrasive pads should be avoided.

END OF SECTION 07 21 16

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes non-fire rated joint sealants for the following applications, including those specified by reference to this Section:
   1. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Vertical joints on exposed surfaces of interior unit masonry, concrete walls, and partitions.
      c. Perimeter joints between gypsum board partitions and ceilings and adjacent surfaces.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      e. Other joints as indicated.
   2. Interior joints in the following horizontal traffic surfaces:
      a. Isolation joints in cast-in-place concrete slabs.
      b. Other joints as indicated.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

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.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

2.2 JOINT SEALANTS, GENERAL

A. 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.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. 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.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in Joint-Sealant Schedule at end of Part 3.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type B (bicellular 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 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 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Remove laitance and form-release agents from concrete.
   3. 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. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Glazed surfaces of ceramic tile.

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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type 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.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. 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.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with 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 in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

A. 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.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT SEALANT SCHEDULE

A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   1. Application: All interior non-rated, non-traffic joints, unless otherwise specified.
   2. Products:
      a. Master Builders Solutions; MasterSeal NP 1.
      b. Pecora Corporation; Dynatrol I-XL.
      c. Sika Corporation, Inc.; Sikaflex-1a.
      d. Tremco Incorporated; Dymonic.

B. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Uses T and I.
   1. Applications: Interior control, expansion, and isolation joints in horizontal traffic surfaces of concrete floors remaining exposed-to-view.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Master Builders Solutions; MasterSeal NP 2.
      b. Pecora Corporation; Dynatred.
      c. Sika Corporation; Sikaflex-2c NS.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior standard steel doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation 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. Hollow metal door and frame manufacturer is responsible for providing an unobstructed raceway in frame from specified electrical hardware components to connection point at top of frame.

1.4 ACTION SUBMITTALS

A. Product Data Submittals: For each product.
   1. Include construction details, material descriptions, core descriptions, energy performance, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   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 each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of conduit and preparation for power, signal, and control systems.

C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door; AADG, Inc.; ASSA ABLOY.
   2. Curries, AADG, Inc.; ASSA ABLOY Group.
   3. Republic Doors and Frames; a Allegion brand.
   4. Steelcraft; Allegion plc.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
   1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B..
   1. Doors:
      a. Type: As indicated in the Door and Frame Schedule on Drawings.
      b. Thickness: 1-3/4 inches (44.5 mm).
      c. Face: Uncoated steel sheet, unless metallic-coated steel is indicated, minimum thickness of 0.042 inch (1.0 mm).
      d. Edge Construction: Model 2, Seamless.
      e. Core: Kraft-paper honeycomb, unless otherwise indicated.
      f. Fire-Rated Core: As required to provide fire-protection and temperature-rise ratings indicated.
   2. Frames:
      a. Materials: Uncoated steel sheet, unless metallic-coated sheet is indicated, minimum thickness of 0.053 inch (1.3 mm).
      b. Construction: Face welded.
   3. Exposed Finish: Prime.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 unless otherwise indicated.
   1. Provide minimum 0.167-inch (7 gage) steel or equivalent thread depth for hinges.
   2. Provide minimum 0.167-inch (7 gage) steel for floor closers and pivots.
   3. Provide minimum 0.093-inch (12 gage) steel for lock front, closers and overhead hold-open/stop arms.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 unless otherwise indicated.
   1. Provide minimum 0.167-inch (7 gage) steel or equivalent thread depth for hinges.
   2. Provide minimum 0.167-inch (7 gage) steel for floor closers and pivots.
   3. Provide minimum 0.093-inch (12 gage) steel for lock front, closers and overhead hold-open/stop arms.

2.4 FRAME ANCHORS

A. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
   2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
   3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
   1. Provide steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B for anchors of frames fabricated from metallic-coated steel sheet.

2.5 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

F. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.7 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 metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
   2. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
   3. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
   4. Glazed Lites: Factory cut openings in doors.

C. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
   1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
   2. Sidelite 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 welding.
   3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 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. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
      b. Install frames with removable stops located on secure side of opening.
   2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
   3. Floor Anchors: Secure with postinstalled expansion anchors.
   4. Solidly pack mineral-fiber insulation inside frames.

5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
1. Non-Fire-Rated Steel Doors:
    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch plus or minus 1/32 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch plus or minus 1/32 inch.
    e. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08 11 13

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SECTION 08 36 13 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sectional-door assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory.
   1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
   2. For power-operated doors, include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   4. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied finishes.
   1. Include Samples of accessories involving color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranties: For manufacturer's warranty and finish warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Failure of components or operators before reaching required number of operation cycles.
      c. Faulty operation of hardware.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
      e. Delamination of exterior or interior facing materials.
   2. Warranty Period: Five years from date of Substantial Completion.

B. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain sectional doors from single source from single manufacturer.
   1. Obtain operators and controls from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
   1. Design Wind Load: As indicated on Structural Drawings.
   2. Testing: In accordance with ASTM E330/E330M or DASMA 108 for garage doors and complying with DASMA 108 acceptance criteria.
   3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
      a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.
      b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.
   4. Operability under Wind Load: Design sectional doors to remain operable under uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa) wind load, acting inward and outward.

C. Seismic Performance: Provide sectional doors that withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
   1. Seismic Design Criteria: As indicated on Structural Drawings.

2.3 SECTIONAL-DOOR ASSEMBLY

A. Sectional Door: Provide steel sectional door, IECC-compliant, formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Arm-R-Lite Manufacturing Co., Inc.
      b. C.H.I. Overhead Doors, Inc.
      c. Clopay Building Products.
      d. Overhead Door Corporation.
      e. Raynor Garage Doors.
      f. Wayne Dalton; a division of Overhead Door Corporation.

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.

C. Air Infiltration: Maximum rate when tested in accordance with ASTM E283 or DASMA 105.
   1. Air Infiltration at Perimeter (Floor, Jamb, or Head Seals): Maximum rate of 0.15 cfm/sq. ft. at 25 mph.
   2. Air Infiltration (Section Joints): None, when tested at 25 mph.

D. U-Value: 0.052 Btu/sq. ft. x h x deg F (0.295 W/sq. m x K).

E. Steel Door Sections: ASTM A653/A653M, zinc-coated (galvanized), cold-rolled, commercial steel sheet with G60 (Z180) zinc coating.
   1. Door-Section Thickness: 2 inches (51 mm).

EQUIVALENT THICKNESSES OF SHEET METAL GAGES

GAGE NO.	INCH	MM
16	0.064	1.63
20	0.040	1.02
22	0.034	0.86
24	0.028	0.71
26	0.022	0.56

   2. Section Faces:
      a. Thermal-Break Construction: Provide sections with continuous thermal-break construction separating the exterior and interior faces of door.
      b. Exterior Face: Fabricated from single sheets, not more than 24 inches (610 mm) high; with horizontal meeting edges rolled to continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove, weather- and pinch-resistant seals and reinforcing flange return.
         1) Steel Sheet Thickness: 0.040-inch (1.02-mm) nominal coated thickness.
         2) Surface: Manufacturer's standard.
      c. Interior Face: Enclose insulation completely within steel exterior facing and interior facing material, with no exposed insulation. Provide the following interior-facing material:
         1) Zinc-Coated (Galvanized) Steel Sheet: With minimum nominal coated thickness of 0.028 inch (0.71 mm).
   3. End Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than nominal coated thickness and welded to door section.
   4. Intermediate Stiles: Provide intermediate stiles formed from not less than 0.064-inch-(1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
   5. Section Reinforcing: Horizontal and diagonal reinforcement as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.
      a. Bottom Section: Reinforce section with a continuous channel or angle conforming to bottom-section profile.
      b. Hardware Locations: Provide reinforcement for hardware attachment.
   6. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard insulation of type indicated below:
      a. Foamed-in-Place Insulation: Polyurethane, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load.

F. Track: Manufacturer's standard, galvanized-steel, standard-lift track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.
   1. Material: Galvanized steel, ASTM A653/A653M, minimum G60 (Z180) zinc coating.
   2. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors.

G. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom, top, and jambs of door.

H. Exhaust Port: Aluminum assembly consisting of clamping rings, sleeve-through wall, and exterior cap with latching device; in thickness required by door thickness and diameter to accommodate Owner's exhaust hose.

I. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.
   1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch (2.01-mm) nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.
      a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.
      b. Provide double-end hinges where required for doors more than 16 ft. (4.88 m) wide unless otherwise recommended by door manufacturer in writing.
   2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.
      a. Roller-Tire Material: Case-hardened steel.
   3. Push/Pull Handles: Equip each door with galvanized-steel lifting handles on each side of door, finished to match door.

J. Locking Device:
   1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

K. Counterbalance Mechanism:
   1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated, mounted on torsion shaft.
   2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.
      a. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.
      b. Provide one additional midpoint bracket for shafts up to 16 ft. (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 ft. (4.88 m) long unless closer spacing is recommended in writing by door manufacturer.
   3. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 5 to 1.
   4. Cable Safety Device: Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
   5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
   6. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

L. Manual Door Operator:
   1. Push-Up Operation: Lift handles and pull rope for raising and lowering doors located on inside and outside of bottom section; with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf (111 N).

M. Electric Door Operator: Electric door operator assembly of size and capacity recommended by door manufacturer for door and operation cycles specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Comply with NFPA 70.
   2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24 V ac or dc.

3. Safety: Listed in accordance with UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. (2.4 m) or lower.
4. Operator Type: Jackshaft, center mounted.
5. Motor: Reversible-type with controller (disconnect switch) for interior, clean, and dry motor exposure. Use adjustable motor-mounting bases for belt-driven operators.
    a. Motor Size: As required to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
    b. Electrical Characteristics:
        1) Phase: Single phase.
        2) Volts: 115 V.
6. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
7. Obstruction Detection: Automatic external entrapment protection consisting of automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
    a. Monitored Entrapment Protection: Photoelectric sensor designed to interface with door-operator control circuit to detect damage to or disconnection of sensor and complying with requirements in UL 325.
8. Control Station: Surface mounted, two-position (open and close) control.
    a. Operation: Push button interior and key exterior.
    b. Interior-Mounted Unit: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
    c. Exterior-Mounted Unit: Full-guarded, surface-mounted, standard-duty, weatherproof type, NEMA ICS 6, Type 4 enclosure.
    d. Features: Provide the following:
        1) Vehicle detection operation.
        2) Radio-control operation.
        3) Card-reader control.
        4) Photocell operation.
        5) Door-timer operation.
9. Emergency Manual Operation: Push-up type designed so required force for door operation does not exceed 25 lbf (111 N).
10. Emergency Operation Disconnect Device: Hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
11. Motor Removal: Design operator so motor can be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

N. Metal Finish: Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
1. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
    a. Exterior Finish: Factory apply additional enamel topcoat; color as selected by Architect from manufacturers full range of colors equivalent to Sherwin-Williams color chart of more than 1,800 colors).
        1) Basis of Design: Raynor; OptiFinish.
    b. Interior Finish: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions and as specified.

B. Tracks:
   1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches (610 mm) apart.
   2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Power-Operated Doors: Install automatic garage doors openers in accordance with UL 325.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks in accordance with manufacturer's written instructions.
   2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.

D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.5 DEMONSTRATION

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

END OF SECTION 08 36 13

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanical door hardware for swinging doors.

1.2 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of product data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
   2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
   3. Content: Include the following information:
      a. Identification number, location, hand, fire rating, size, and material of each door and frame.
      b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
      c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
      d. Fastenings and other installation information.
      e. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
      f. Mounting locations for door hardware.
      g. List of related door devices specified in other Sections for each door and frame.

C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
   1. Warehousing Facilities: In Project's vicinity.
   2. Scheduling Responsibility: Preparation of door hardware and keying schedule.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including excessive deflection, cracking, or breakage.
      b. Faulty operation of doors and door hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
   2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of door hardware from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

B. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the ABA standards of the Federal agency having jurisdiction.
   1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
   2. Comply with the following maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.

2.3 HINGES

A. Hinges: ANSI/BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

B. Hinges on outswing doors with keyed locks to have non-removable pins (NRP).

C. All hinges to have ball tip.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bommer Industries, Inc.
2. Hager Companies.
3. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Deadbolts: Minimum 1.25-inch (32-mm) bolt throw.

C. Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.

D. Lock Trim:
1. Description: As indicated on Schedule.
2. Levers: Cast.
3. Escutcheons (Roses): Cast.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

F. Bored Locks: ANSI/BHMA A156.2, Grade 1, Series 4000.

G. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
2. SARGENT Manufacturing Company; ASSA ABLOY.
3. Schlage.

2.5 AUXILIARY LOCKS

A. Bored Auxiliary Locks: ANSI/BHMA A156.36, Grade 1; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.

b. SARGENT Manufacturing Company; ASSA ABLOY.
c. Schlage.

2.6 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

B. Standard Lock Cylinders: ANSI/BHMA A156.5, Grade 1 permanent cores; face finished to match lockset.
1. Core Type: Removable.

2.7 KEYING

A. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
1. Existing System:
a. Master key or grand master key locks to Owner's existing system.
b. Re-key Owner's existing master key system into new keying system.
2. Provide 7 pin SFIC “Q” keyway core.
3. Coordinate with Owner’s key system requirements.

2.8 SURFACE CLOSERS

A. Surface Closers: ANSI/BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
b. LCN.
c. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
d. Norton Door Controls; ASSA ABLOY.

B. Supplier to furnish all drop plates and mounting brackets as required for proper installation.

C. Install closers on side of door for least visibility, unless mounting is required for maximum door swing or protect closure from moisture or corrosive materials.

D. Installer to properly adjust all hydraulic and spring adjustments for proper operation of closer and door.

E. Contractor to check and adjust all closers when mechanical systems are in operation.

2.9 MECHANICAL STOPS (WALL AND FLOOR) AND HOLDERS (KICK DOWN)

A. Wall- and Floor-Mounted Stops: ANSI/BHMA A156.16.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Ives.
b. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
c. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
d. Trimco.

B. Door-Mounted Holders: BHMA A156.16.

C. Stops to be cast brass or bronze.

2.10 DOOR GASKETING

A. Door Gasketing: ANSI/BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
      b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
      c. Reese Enterprises, Inc.

B. Maximum Air Leakage: When tested in accordance with ASTM E283/E283M with tested pressure differential of 0.3 inch wg (75 Pa), as follows:
   1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
   2. Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.

2.11 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

2.12 FABRICATION

A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18.

B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
   1. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
   2. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.13 FINISHES

A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION OF DOOR HARDWARE

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
   1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (760 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
   1. Replace construction cores with permanent cores as directed by Owner.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
   1. Do not notch perimeter gasketing to install other surface-applied hardware.

3.4 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.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

A. Basis of Design:
1. Finishes: Match US32D (630 satin stainless steel).
2. Hinges: McKinney, T4A 3386 x BT NRP 5”x5” (heavy weight).
3. Bored Lock with Levers (ANSI F75 Passage): Sargent, 10 line series (G Rose with Standard B levers).
4. Bored Auxiliary Lock: Sargent, 480 series.
5. Deadbolt (Interior Thumb Turn): Function 485.
6. Lock Cylinder and Core: In accordance with Owner’s requirements.
7. Overhead Closer: Sargent, 1431 series.
8. Door-Mounted Holder (Kick Down): Ives, FS455.
9. Wall Bumper (Convex Rubber): Ives, WS406CVX.
10. Protection Plate: Rockwood, K1050 6” 4BE CSK.
11. Perimeter Gasketing: Pemko, 303_S (PG).

B. Schedule:
1. Hardware Set 100: Door from garage to unit caged storage and new bay.
   a. Type: Hollow metal door in metal frame.
   b. Handing: RH.
   c. Quantity:

3	HINGES
1	BORED CYLINDRICAL LEVER LOCK (STOREROOM SET)
1	BORED AUXILIARY LOCK (DEADBOLT)
1	LOCK CYLINDER
1	OVERHEAD DOOR CLOSER
1	WALL BUMPER
2	DOOR PROTECTION PLATE
1	KICK DOWN
1 SET	PERIMETER GASKETING

2. Hardware Set 101: Overhead sectional door from unit caged storage to exterior.
   a. Type: Overhead coiling door.
   b. Owner to verify how overhead sectional door to lock. Review Section 08 36 13 – Sectional Doors.
   c.

END OF SECTION 08 71 00

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SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonstructural steel framing systems for interior gypsum board assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Track: Provide documentation that framing members are certified in accordance with product-certification program of the Steel Framing Industry Association or are a part of a similar organization that provides a verifiable code compliance program.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Protect materials from corrosion, deformation, and other damage during delivery, storage, and handling in accordance with AISI's "Code of Standard Practice."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design framing systems in accordance with American Iron and Steel Institute Publication "S220 - North American Standard for Cold-Formed Steel Framing - Nonstructural Members", except as otherwise shown or specified.

B. Deflection Limits: Select steel studs in accordance with the manufacturer's standard load tables and following design pressures and deflections:
   1. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
   2. Interior Non-Load-Bearing Framing (with Plaster or Ceramic Tile Finish): Horizontal deflection of 1/360 of the wall height.

C. Fire-Test-Response Characteristics: Where indicated on Drawings, provide assemblies incorporating nonstructural steel framing identical to those of assemblies tested for fire resistance in accordance with ASTM E119 by an independent testing agency.

D. STC-Rated Assemblies: Where indicated on Drawings, provide assemblies incorporating nonstructural framing identical to those of assemblies tested in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

2.2 NONSTRUCTURAL STEEL FRAMING

A. Framing Members, General: Comply with requirements in AISI S220 for conditions indicated on Drawings.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.

2. Protective Coating: ASTM A653/A653M, G40 (Z120) with equivalent corrosion resistance of ASTM A653/A653M, G40 ; roll-formed from steel meeting mechanical and chemical requirements of ASTM A 1003 with a zinc-based coating, or coating with demonstrated equivalent corrosion resistance. Galvannealed products are unacceptable.
    a. Equivalent Corrosion-Resistant Coating: Evaluation report acceptable to authorities having jurisdiction demonstrates corrosion resistance equivalent to specified protective coating.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Tracks: ASTM C 645. Use either steel studs and tracks meeting minimum base-metal thickness or equivalent gauge thickness steel studs and tracks.
1. Depth: As indicated on Drawings.
2. Minimum Base-Metal Thickness: As required to meet performance requirements, but not less than 0.0179 inches.
    a. Jamb Framing: Install one stud and one runner, each of minimum 0.0329-inch base-metal thickness, interlocked to form box section on each side of opening. Locate one additional stud of minimum 0.0329-inch base-metal thickness directly adjacent to stud/runner box section. Mechanically fasten studs and runner to each other.
    b. Partitions Receiving Tile Finish: Minimum base-metal thickness of 0.0329 inch at steel framing members supporting tile installations.
3. Equivalent Gauge Thickness Steel Studs and Track: Members that demonstrate certified third-party testing in accordance with ICC ES AC86 (Approved May 2015) need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645. Submission of an evaluation report is acceptable to demonstrate conformance to this requirement.

B. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 3-inch- deep flanges in thickness not less than indicated for stud, installed with stud friction fit into top runner and with continuous bridging located within 12 inches of the top of stud to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 3-inch- deep flanges in thickness not less than indicated for stud and fastened to stud, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for stud and in width to accommodate depth of stud.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Products: Subject to compliance with requirements, provide one of the following:
    a. ClarkDietrich Building Systems; BlazeFrame DSL.
    b. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
    c. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0428 inch.

E. U- Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.0538-inch- thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch.

2. Depth: 7/8 inch, unless otherwise indicated.

G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
1. Provide resilient furring channels identical to those used in test assembly to achieve required STC rating.

H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4-inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, substrates, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 INSTALLATION OF NONSTRUCTURAL METAL FRAMING, GENERAL

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with framing members. Frame both sides of joints independently.

3.3 INSTALLATION OF NONSTRUCTURAL STEEL FRAMING

A. Install framing system components at spacings indicated on Drawings, but not greater than spacings required by referenced installation standards for assembly types.
1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated on Drawings.
2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated on Drawings.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install track at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated on Drawings to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
      a. Install interlocked, formed box section as described in Part 2 on each side of opening.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure unless otherwise indicated on Drawings.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated on Drawings. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated on Drawings and support closures to make partitions continuous from floor to underside of solid structure.
      a. Firestop Track: Install to maintain continuity of fire-resistance-rated assembly indicated on Drawings.
   5. STC-Rated Partitions: Install framing to comply with STC-rated assembly indicated on Drawings.

E. Direct Furring:
   1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Shaped Furring Members:
   1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 16 inches o.c.
   2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
   3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerances for Nonstructural Steel Framing:
   1. Framing Members: Install each framing member so fastening surfaces vary not more than 1/8 inch (3.2 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 09 22 16

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 THERMOSET-RUBBER BASE

A. Resilient Base:
   1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong World Industries, Inc.
b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Johnsonite, a Tarkett Co.
e. Roppe Corporation, USA.
f. VPI, LLC; Floor Products Division.

B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
1. Style and Location:
a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient floor coverings or exposed concrete.

C. Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: As indicated in Finish and Materials Legend.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible.
      a. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:
   1. Remove adhesive and other blemishes from surfaces.
   2. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

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SECTION 09 91 00 – PAINTS AND COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of interior paints and coatings systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. 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.
   5. Samples of stained-wood finish, on representative surface.

C. 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.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. 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.

C. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F and maximum of 90 degrees F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

D. Comply with OSHA standards and local fire regulations.

1.4 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.

B. Do not apply paints in snow, rain, fog, or mist, when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

C. Apply varnishes only when temperature of surfaces to be varnished and ambient air temperatures are not less than 65 degrees F for interior applications, unless otherwise approved by manufacturer.

D. Provide lighting level of not less than 80 foot-candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products listed in Schedules at end of Part 3.

2.2 PAINT, GENERAL

A. 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. 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.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

C. Colors: Match Architect's samples.

2.3 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.

B. Patching Materials:
   1. Gypsum Board: Latex filler.
   2. Wood-Patching Compound: Two-part, epoxy-resin, wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials. Compound shall be capable of filling voids, spreading to feather edge and receive stain.
   3. Metal-Patching Compound: Two-part, polyester-resin, metal-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of metal repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be produced for filling metal that has corrosion or has received scratches or indentations. Filler shall be capable of filling deep holes and spreading to feather edge.

C. Fastener Head Cover Materials: Latex filler.

PART 3 - EXECUTION

3.1 MAINTENANCE REPAINTING, GENERAL

A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet (1.5 m) away from painted surface.

B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:
   1. Remove failed coatings and corrosion and repaint.
   2. Verify that substrate surface conditions are suitable for repainting.
   3. Allow other trades to repair items in place before repainting.

C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.

D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.2 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. 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 field or shop-applied primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions 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. Surfaces: Correct defects and clean surfaces capable of affecting work of this section. Remove or repair existing coatings exhibiting surface defects.

D. 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.

E. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

F. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

3.4 EXISTING SUBSTRATES

A. For previously painted surfaces, remove surface grime by washing with detergent, TSP or sal soda solution. Rinse thoroughly with clean water until all residue is removed. Sand glossy surfaces to improve bond for new coats of paint. Scrap or use a wire brush to remove loose paint and blisters. Sand edges of chips and blisters.

B. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

C. Existing Wood Substrates - Transparent Finish: Strip existing finishes. Remove dust, grit, and foreign matter. Fill nail holes with tinted caulking compound after sealer has been applied.

3.5 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
6. Sand wood and metal surfaces lightly between coats to achieve required finish.
7. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
8. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
9. Prime concealed surfaces of interior and exterior woodwork with primer paint.

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. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
1. 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 shop primed equipment indicated to receive paint finish.
2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
3. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished or occurring in unfinished interior spaces.
4. Paint interior surfaces of air ducts and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint applied to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
5. Paint exposed conduit and electrical equipment occurring in finished areas.
6. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
7. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
8. Do not paint over telecommunications cables or detection or monitoring devices.

3.6 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.

3.7 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.

3.8 INTERIOR PAINTING SCHEDULE

A. CMU Substrates: Acrylic coating; two (2) finish coats over prime coat.
   1. Prime Coat:
      a. PPG Paints; Speedhide Interior/Exterior Block Filler, 6-15XI.
      b. Sherwin-Williams; PrepRite Block Filler, B25W25 series.
   2. Finish Coats:
      a. PPG Paints; Speedhide Manor Hall Interior Satin, 82-3410.
      b. Sherwin-Williams; Duration Home Interior Latex Satin, A97 series.

B. Metal Substrates: Acrylic epoxy coating, two (2) finish coats over prime coat.
   1. Prime Coat: (Omit prime coat on shop primed components.)
      a. PPG Paints; Pitt Tech Plus Primer, 4020.
      b. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Acrylic Primer, B66-310 series.
   2. Finish Coats:
      a. PPG Paints; PITT-GLAZE WB1 Water-Borne Acrylic Epoxy, Semi-Gloss, 16-510 series.
      b. Sherwin-Williams; Pre-Catalyzed Water Based Epoxy Semi-gloss, K46-150 series.

C. Gypsum Board Substrates, Ceilings: Vinyl acrylic coating; two (2) finish coats over prime coat.
   1. Prime Coat:
      a. PPG Paints; Speedhide 6-2.
      b. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
   2. Finish Coats:
      a. PPG Paints; Speedhide Zero VOC, Eggshell 6-4310XI.
      b. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Low-Sheen Eg-Shel, B24-2600 series.

D. Gypsum Board Substrates, Walls: Acrylic coating; two (2) finish coats over prime coat.
   1. Prime Coat:
      a. PPG Paints; Speedhide 6-2.
      b. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
   2. Finish Coats:
      a. PPG Paints; Manor Hall Interior Satin, 82-3410.
      b. Sherwin-Williams; Duration Home Interior Latex Satin, A97 series.

E. Wood: Walls and trim.
   1. Eg-Shel / Satin Finish Scuff Resistant Waterbased Enamel:
      a. 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils. wet, 1.8 mils. dry per coat).
      b. 2nd Coat: Sherwin-Williams Scuff Tuff Int. Waterbased Enamel, Eg-Shel, S24-150 series:
      c. 3rd Coat: Sherwin-Williams Scuff Tuff Int. Waterbased Enamel, Eg-Shel, S24-150 series (4 mils. wet, 1.2 mils. dry per coat).

F. Finish Carpentry: Plywood board paneling.
   1. Prime Coat:
      a. PPG Paints; Seal Grip Gripper.
      b. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
   2. Finish Coats:
      a. PPG Paints; Manor Hall Interior Satin, 82-3410.
      b. Sherwin-Williams; Duration Home Interior Latex Satin, A97 series.

END OF SECTION 09 91 00

SECTION 10 22 13 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Heavy-duty wire mesh partitions.
   2. Wire mesh ceilings.

1.2 DEFINITIONS

A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.

B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Wire mesh partitions and ceilings.
   2. Vertical and horizontal frames.
   3. Reinforcing and capping bars.
   4. Corner posts.
   5. Hinge door frames.
   6. Locks.

B. Shop Drawings:
   1. Include plans, elevations, sections, and attachment details.
   2. Indicate clearances required for operation of doors and gates.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for units with factory-applied color finishes.

D. Samples for Verification: Panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.
   1. Size: 12 by 12 inches (300 by 300 mm).

E. Delegated Design Submittals: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Welding certificates.

B. Qualification Statements: For Installer.

C. Delegated design engineer qualifications.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wire mesh partition hardware.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Door Locks: Furnish 5 percent of quantity installed for each type indicated, but no fewer than two locks.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Authorized representative who is trained and approved by manufacturer.
   2. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
      a. AWS D1.1/D1.1M.
      b. AWS D1.3/D1.3M.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped and palleted or crated to provide protection during transit and Project-site storage. Use vented plastic.

B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.
   1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

C. Deliver keys to Owner by registered mail or overnight package service.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 WIRE MESH PARTITIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Acorn Wire & Iron Works
   2. California Wire Products Corporation
   3. Central Wire & Iron Works, LLC
   4. SpaceGuard Products
   5. Standard Wire & Steel Works
   6. WireCrafters, LLC

2.2 SOURCE LIMITATIONS

A. For wire mesh products, obtain each color, grade, finish, type, and variety from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design wire mesh units.

B. Structural Performance: Wire mesh units to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
   1. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m) at any location on a panel.
   2. Total load of 200 lbf (0.89 kN) applied uniformly over each panel.
   3. Concentrated load and total load need not be assumed to act concurrently.

C. Regulatory Requirements: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC A117.1 for doors and gates designated as accessible.

2.4 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh:
   1. 0.192-inch- (4.9-mm-) diameter, intermediate-crimp steel wire woven into 2-inch (50-mm) diamond mesh.
   2. 0.192-inch- (4.9-mm-) diameter steel wire, resistance welded into 1-1/2-by-2-1/2-inch (38-mm-by-65-mm) rectangular mesh.

B. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3.2-mm) cold-rolled steel channels; with holes for 3/8-inch- (9.5-mm-) diameter bolts not more than 12 inches (300 mm) o.c.

C. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 1 by 1/2 by 1/8 inch (25 by 13 by 3.2 mm), bolted or riveted toe to toe through mesh.

D. Top Capping Bars: 3-by-1-inch (76-by-25-mm) steel channels.

E. Posts for 90-Degree Corners: 1-1/2-by-1-1/2-by-1/8-inch (38-by-38-by-3.2-mm) steel angles or tubes or 2-by-2-by-0.075-inch (50-by-50-by-1.9-mm) cold-rolled steel angles or tubes, with holes for 3/8-inch- (9.5-mm-) diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch (6.4-mm) steel base plates.

F. Posts for Other-Than-90-Degree Corners: 2-inch- (50-mm) OD by 1/8-inch (3.2-mm) steel pipe or round tube, with holes for 3/8-inch- (9.5-mm-) diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch (6.4-mm) steel base plates.

G. Adjustable Corner Posts: Two 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3.2-mm) cold-rolled, steel channels or 2-by-2-by-0.075-inch (50-by-50-by-1.9-mm) steel tubes connected by steel hinges at 36 inches (900 mm) o.c. attached to posts; with 1/4-inch- (6-mm-) diameter bolt holes aligning with bolt holes in vertical framing; with 1/4-inch (6.4-mm) steel base plates.

H. Line Posts: 3-inch-by-4.1-lb (76-mm-by-1.9-kg) or 3-1/2-by-1-1/4-by-1/8-inch (89-by-32-by-3.2-mm) steel channels; with 1/4-inch (6.4-mm) steel base plates.

I. Three- and Four-Way Intersection Posts: 2-by-2-by-0.075-inch (50-by-50-by-1.9-mm) steel tubes, with holes for 3/8-inch- (9.5-mm-) diameter bolts aligned for bolting to adjacent panels; with 1/4-inch (6.4-mm) steel base plates.

J. Floor Shoes: Metal, not less than 2 inches (50 mm) high; sized to suit vertical framing, drilled for attachment to floor, and with setscrews for leveling adjustment.

K. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3.2-mm) steel channels, banded with 1-1/2-by-1/8-inch (38-by-3.2-mm) flat steel bar cover plates on four sides, and with 1/8-inch- (3.2-mm-) thick angle strike bar and cover on strike jamb.
   1. Hinges: Full-surface type, 3-1/2-by-3-1/2-inch (89-by-89-mm) steel, three per door; bolted, riveted, or welded to door and jamb framing.
   2. Padlock Lug: Mortised into door framing and enclosed with steel cover.

3. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.

L. Accessories:
1. Adjustable Filler Panels: 0.060-inch- (1.5-mm-) thick, steel sheet; capable of filling openings from 2 to 12 inches (50 to 300 mm).
2. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch (25 mm) of adjustment.

M. Finish: Powder-coated finish unless otherwise indicated.
1. Color: Black.

2.5 WIRE MESH CEILINGS

A. Mesh, Framing, and Stiffeners: Fabricated from same mesh and framing as wire mesh partition panels.

B. Perimeter Partition Supports: 1-1/2-by-1-1/2-by-1/8-inch (38-by-38-by-3.2-mm) steel angle, with holes for 1/4-inch- (6-mm-) diameter bolts aligned for bolting to top of wire mesh partitions and to sides of wire mesh ceiling panels.

C. Wall Supports: 1-1/2-by-1-1/2-by-1/8-inch (38-by-38-by-3.2-mm) steel angle punched for attachment to wall and wire mesh ceiling panels.

D. Intermediate Supports: Steel I-beams or rectangular tubes, as recommended by manufacturer.

E. Intermediate Support Posts: 2-by-2-by-1/8-inch (50-by-50-by-3.2-mm) steel tubes.

F. Finishes: Match adjacent wire mesh partitions.

2.6 MATERIALS

A. Steel Wire: ASTM A510/A510M.

B. Steel Plates, Channels, Angles, and Bars: ASTM A36/A36M.

C. Steel Sheet: Cold-rolled steel sheet, ASTM A1008/A1008M, Commercial Steel (CS), Type B.

D. Steel Pipe: ASTM A53/A53M, Schedule 40, unless another weight is indicated or required by structural loads.

E. Steel Tubing: ASTM A500/A500M, cold-formed structural-steel tubing or ASTM A513/A513M, Type 5, mandrel-drawn mechanical tubing.

F. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.

G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

H. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

I. Power-Driven Fasteners: ICC-ES AC70.

J. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting."

K. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, complying with MPI#79.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

L. Zinc-Rich Primer: Compatible with topcoat, complying with SSPC-Paint 20 or SSPC-Paint 29.

M. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.7 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.
   1. Fabricate wire mesh items to be readily disassembled.
   2. Welding: Weld corner joints of framing; remove spatter and finish sand.

B. Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
   1. Mesh: Securely clinch and weld mesh to framing.
   2. Framing: Fabricate framing with mortise-and-tenon corner construction.
      a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
      b. Fabricate three- and way intersections using intersection posts.
      c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
   3. Fabricate wire mesh partitions with 3 to 4 inches (75 to 100 mm) of clear space between finished floor and bottom horizontal framing.
   4. Doors: Align bottom of door with bottom of adjacent panels.
      a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
   5. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

C. Wire Mesh Ceilings: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
   1. Mesh: Securely clinch and weld mesh to framing.
   2. Framing: Fabricate framing with welded corner construction.
      a. Provide stiffeners as indicated or, if not indicated, as required by panel span and as recommended by wire mesh ceiling manufacturer. Weld stiffeners to framing.

D. Wire Mesh Stairway Partitions: Provide door jamb framing on each side of doors. Attach tamper shields centered behind exit devices.

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
   1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean items of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to uncoated surfaces of wire mesh units unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

E. Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard enamel finish, suitable for use indicated, with a minimum dry film thickness of 2 mils (0.05 mm).
   1. Color and Gloss: Black gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

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

3.2 INSTALLATION OF WIRE MESH PARTITIONS

A. Anchor wire mesh partitions to floor with 3/8-inch- (9.5-mm-) diameter, postinstalled expansion anchors at 12 inches (300 mm) o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
   1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

B. Anchor wire mesh partitions to walls at 12 inches (305 mm) o.c. through back corner panel framing and as follows:
   1. For concrete and solid masonry anchorage, use expansion anchors.
   2. For hollow masonry anchorage, use toggle bolts.
   3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
   4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
   5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

C. Secure top capping bars to top framing channels with 1/4-inch- (6-mm-) diameter, "U" bolts spaced not more than 28 inches (700 mm) o.c.

D. Provide line posts at locations indicated or, if not indicated, as follows:
   1. On each side of sliding-door openings.
   2. For partitions that are 7 to 9 ft. (2.1 to 2.7 m) high, spaced at 15 to 20 ft. (4.6 to 6.1 m) o.c.
   3. For partitions that are 10 to 12 ft. (3.0 to 3.7 m) high, located between every other panel.
   4. For partitions that are more than 12 ft. (3.7 m) high, located between each panel.

E. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

F. Install doors complete with door hardware.

G. Install service windows complete with window hardware.

H. Weld or bolt sheet metal bases to wire mesh partitions and doors.

I. Bolt accessories to wire mesh partition framing.

3.3 INSTALLATION OF WIRE MESH CEILINGS

A. Anchor wall support angle to walls at 12 inches (300 mm) o.c. and as follows:
   1. For concrete and solid masonry anchorage, use expansion anchors.
   2. For hollow masonry anchorage, use toggle bolts.
   3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.

B. Attach wire mesh ceiling panels to wall support angles with bolts at 12 inches (305 mm) o.c.

C. Attach wire mesh ceiling panels to wire mesh partitions with slotted angles bolted to sides of ceiling panels and to top of partitions at 12 inches (305 mm) o.c.

D. Attach wire mesh ceiling panels to intermediate supports as recommended by manufacturer.

3.4 REPAIR

A. Repair Painting:
   1. Wire brush and clean rust spots, welds, and abraded areas immediately after installation, and apply repair paint with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
      a. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

3.5 ADJUSTING

A. Adjust doors and gates to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Verify that latches and locks engage accurately and securely without forcing or binding.

3.6 PROTECTION

A. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

END OF SECTION 10 22 13

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SECTION 13 34 22 – PRE-ENGINEERED BUILDING COMPONENTS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall panels and trims.

1.2 REFERENCES

A. ASTM A792 – Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.

B. ASTM A1011 SS or ASTM A1011HSLAS – Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

C. MBMA Metal Building Systems Manual – 2018 Edition.

D. NAIMA 202 – Standard for Flexible Fiberglass Insulation Systems in Metal Buildings.

E. SSPC-SP2 – Steel Structures Painting Council, Surface Preparation Specification No. 2, Hand Tool Cleaning.

1.3 SYSTEM DESCRIPTION

A. The project shall include wall covering, trim, fasteners, closures, sealer, insulation, and other miscellaneous items as stated in the Specifications and/or shown or called for on the Drawings.
   1. Wall system consists of preformed steel panels, trim, and accessories as required for a complete installation.

1.4 SUBMITTALS

A. Erection Drawings including:
   1. Panel layout
   2. Flashing details
   3. Accessory details

1.5 WARRANTY

A. Provide the Owner with a copy of all warranties.

PART 2 - PRODUCTS

2.1 MATERIALS – WALL SYSTEMS

A. Interior wall panel.

B. Liner panel, if required, shall be 29 gauge with a white polyester finish, roll formed to manufacturer’s standard profile.

2.2 MATERIALS – TRIM

A. Trim shall be 26 gauge with a silicone modified polyester (SMP) topcoat typical to wall panels. The reverse side shall be coated with pigmented polyester. Interior color to be selected from manufacturers standard color choices.

B. Provide all trim pieces necessary to achieve a finished appearance. Gable trim and eave trim or a uniform formed face.

C. Provide trim at all corners of the building and for all sides of framed openings. Provide trim for base of building if required.

2.3 ACCESSORIES

A. Fasteners to be manufacturer’s standard long life fasteners. Exposed fastener heads to be factory painted to match the panel color. Pop rivets shall be used at end laps of eave and gable trims.

B. Closed cell foam closure strips, die cut to match panel configuration, shall be used with standard profile panel. Metal closures shall be used with STC/MSC and MVF/MVP panel.

C. Mastic for roof side laps, end laps, and flashings to be a non-hardening butyl tape, non-corrosive to the substrate, of 100 percent solids. Tape size to be minimum 3/32" x 3/4", supplied in rolls.

D. Caulk shall be manufacturer’s standard product as appropriate for the application.

2.4 FABRICATION

A. Fabricate built-up members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

B. Fabricate cold formed members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

2.5 ERECTION – WALL SYSTEM

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

2.6 INSTALLATION – ACCESSORIES

A. Install accessories in accordance with manufacturer's instructions.

B. Seal wall and roof accessories weathertight.

PART 3 - EXECUTION

3.1 ERECTION – WALL SYSTEM

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

3.2 INSTALLATION – ACCESSORIES

A. Install accessories in accordance with manufacturer's instructions.

B. Seal wall and roof accessories weathertight.

END OF SECTION 13 34 22

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SECTION 23 05 00 - BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 23 Sections. Also refer to Division 01 - General Requirements.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 SCOPE OF WORK

A. This Specification and the associated drawings govern the furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems.

B. Each Contractor shall provide all new materials indicated on the drawings and/or in these specifications, and all items required to make the portion of the Mechanical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.

D. Scope of Work:

1. Air Conditioning and Ventilating Work shall include, but is not necessarily limited to:

    a. Furnish and install package indoor furnace units complete with dampers, filters, coils, fans, and motors.
    b. Furnish and install air-cooled condensing units and curbs.
    c. Furnish and install complete supply air ductwork systems including all fittings, insulation, and outlets.
    d. Furnish and install complete return air ductwork systems including all fittings, insulation, and inlets.
    e. Furnish and install refrigerant piping, accessories, and final charge of refrigerant.
    f. Modify existing gas piping system to serve new Furnace F-1.
    g. Furnish and install complete exhaust ductwork systems including all fittings, insulation, inlets, and fans.
    h. Furnish and install condensate drain piping from cooling related equipment such as air handlers and cooling coil drain pans.
    i. Modify existing gas flues, stacks, and breechings to serve new Furnace F-1.
    j. Furnish and install all temperature control systems.

2. Testing, Adjusting, and Balancing Work shall include, but is not necessarily limited to:

    a. Furnish complete testing, adjusting, and balancing as specified in Section 23 05 93, including, but not limited to, air systems. Conduct a pre-demolition test and balance of the existing ERV-1(E) and F-1(E).

1.3 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

A. Definitions:

1. "Mechanical Contractors" refers to the following:

   a. Air Conditioning and Ventilating Contractor.
   b. Testing, Adjusting, and Balancing Contractor.

2. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case the devices are usually single phase and are usually connected to the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.
3. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
4. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is used to give a control voltage of 120 volts.
5. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc.

   a. This wiring will be from a 120 volt source and may continue as 120 volt, or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature control wiring.

6. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
7. Voltage is generally specified and scheduled as distribution voltage. Motor submittals may be based on utilization voltage if it corresponds to the correct distribution voltage.

Distribution/Nominal Voltage	Utilization Voltage
120	115
208	200
240	230
277	265
480	460

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals reviewed. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.

2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall provide complete electrical power/controls wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. All electrical work shall conform to the National Electrical Code. All provisions of the Electrical Specifications concerning wiring, protection, etc., apply to wiring provided by the Mechanical Contractor unless noted otherwise.
4. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.
5. All Contractors shall establish utility elevations prior to fabrication and shall coordinate their material and equipment with other trades. When a conflict arises, priority is as follows:

    a. Light fixtures.
    b. Gravity flow piping, including condensate.
    c. Sheet metal.
    d. Electrical cable trays, including access space.
    e. Electrical conduits and wireway.

C. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment provided by the Mechanical Contractor, for example:

    a. Burners.
    b. Condensing Units.
    c. Package Air Handling Units.

2. Assumes all responsibility for the low voltage control wiring.
3. Shall verify all existing equipment sizes and capacities where units are to be modified, moved or replaced. Contractor shall notify Architect/Engineer of any discrepancies prior to ordering new units or replacement parts, including replacements of equipment motors.
4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

D. Electrical Contractor's Responsibility:

1. Provides all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor on the Mechanical Drawings or Specifications.
2. Installs and wires all remote control devices furnished by the Mechanical Contractor when so noted on the Electrical Drawings.
3. Provides motor control and temperature control wiring, where so noted on the drawings.
4. Coordinate with the Mechanical Contractor for size of motors and/or other electrical devices involved with repair or replacement of existing equipment.
5. Furnishes, installs and connects all relays, etc., for automatic shutdown of certain fans upon actuation of the Fire Alarm System as indicated and specified in Division 28.
6. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

1.4 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers are acceptable.
2. All Contractors and subcontractors shall employ only workers skilled in their trades.

C. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the State of Iowa's Codes, Laws, Ordinances and other regulations having jurisdiction.
2. Conform to all published standards of Iowa Army National Guard.
3. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
4. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
5. All changes to the system made after letting of the contract, to comply with codes or requirements of Inspectors, shall be made by the Contractor without cost to the Owner.
6. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
7. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

D. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.
4. Pay all fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.

6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
7. Where applicable, all fixtures, equipment and materials shall be approved or listed by Underwriter's Laboratories, Inc.

E. Examination of Drawings:

1. The drawings for the mechanical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.
3. Scaling of the drawings is not sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either on the drawings or in the specifications, it shall be included in this contract.
7. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater number shall govern.
8. Where used in mechanical documents, the word "furnish" shall mean supply for use, the word "install" shall mean connect complete and ready for operation, and the word "provide" shall mean to supply for use and connect complete and ready for operation.

    a. Any item listed as furnished shall also be installed, unless otherwise noted.
    b. Any item listed as installed shall also be furnished, unless otherwise noted.

F. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes or ducts.

G. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.

8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

1.5 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals List:

Referenced Specification Section	Submittal Item
23 05 00	Owner Training Agenda
23 05 53	HVAC Identification
23 05 93	Testing, Adjusting, and Balancing
23 07 13	Ductwork Insulation
23 09 00	Hazardous Gas Controls
23 31 00	Ductwork
23 33 00	Ductwork Accessories
23 34 23	Power Ventilators
23 37 00	Grilles, Registers, and Diffusers
23 40 00	Filters and Filter Systems
23 54 00	Furnaces
23 72 00	Energy Recovery Devices
23 74 11	Packaged Energy Recovery Units
23 82 16	Air Coils

B. General Submittal Procedures: In addition to the provisions of Division 01, the following are required:

1. Transmittal: Each transmittal shall include the following:

a. Date
b. Project title and number
c. Contractor's name and address
d. Division of work (e.g., plumbing, heating, ventilating, etc.)
e. Description of items submitted and relevant specification number
f. Notations of deviations from the contract documents
g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

a. Date
b. Project title and number
c. Architect/Engineer
d. Contractor and subcontractors' names and addresses
e. Supplier and manufacturer's names and addresses
f. Division of work (e.g., plumbing, heating, ventilating, etc.)
g. Description of item submitted (using project nomenclature) and relevant specification number
h. Notations of deviations from the contract documents
i. Other pertinent data
j. Provide space for Contractor's review stamps

3. Composition:

    a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
    b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
    c. All sets shall contain an index of the items enclosed with a general topic description on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; electrical power criteria (e.g., voltage, phase, amps, horsepower, kW, etc.) wiring and control diagrams; Short Circuit Current Rating (SCCR); dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
5. Contractor's Approval Stamp:

    a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
    b. Unstamped submittals will be rejected.
    c. The Contractor's review shall include, but not be limited to, verification of the following:

        1) Only approved manufacturers are used.
        2) Addenda items have been incorporated.
        3) Catalog numbers and options match those specified.
        4) Performance data matches that specified.
        5) Electrical characteristics and loads match those specified.
        6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
        7) Dimensions and service clearances are suitable for the intended location.
        8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
        9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).

    d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
    e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:

    a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
    b. The Contractor shall clearly indicate the size, finish, material, etc.

c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions. or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.
15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

    a. Allow at least two weeks for Architect's/Engineer's review and processing of each submittal.

16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. Submittal file name: 23 XX XX.description.YYYYMMDD
    b. Transmittal file name: 23 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.6 SCHEDULE OF VALUES

A. The requirements herein are in addition to the provisions of Division 01.

B. Format:

1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
2. Submit in Excel format.
3. Support values given with substantiating data.

C. Preparation:

1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
2. Break down all costs into:

    a. Material: Delivered cost of product with taxes paid.
    b. Labor: Labor cost, excluding overhead and profit.

1.7 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.

B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.

C. Change order work shall not proceed until authorized.

1.8 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage. Keep materials clean, dry and free from harmful conditions. Immediately remove any materials that become wet or that are suspected of becoming contaminated with mold or other organisms.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Pipe connections.
2. Duct connections.

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all bearings properly lubricated and all belts properly tensioned and aligned.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.9 NETWORK / INTERNET CONNECTED EQUIPMENT

A. These specifications may require certain equipment or systems to have network, Internet and/or remote access capability ("Network Capability"). Any requirement for Network Capability shall be interpreted only as a functional capability and is not to be construed as authority to connect or enable any Network Capability. Network Capability may only be connected or enabled with the express written consent of the Owner.

1.10 WARRANTY

A. Provide one-year warranty, unless otherwise noted, to the Owner for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this Division of the specifications shall commence on the date of final acceptance, unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

1.11 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the scheduled manufacturer is the basis for job design and establishes the quality required.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections, piping and ductwork connections and arrangement, plumbing connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten days prior to the bid opening.

D. This Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on the Contractors part or on the part of other Contractors whose work is affected.

E. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.

F. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The Contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Covering exterior walls, interior partitions and chases.
2. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will have the opportunity to review the installation and provide a written report noting deficiencies requiring correction. The Contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

C. Above-Ceiling Final Observation

1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:

    a. Pipe insulation is installed and fully sealed.
    b. Pipe and duct wall penetrations are sealed.
    c. Pipe identification and valve tags are installed.
    d. Main, branch and flexible ducts are installed.
    e. Diffusers, registers and grilles are installed and connected to ductwork.

2. In order to prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.

3. It is understood that if the Architect/Engineer finds the ceilings have been installed prior to this review and prior to 7 days elapsing, the Architect/Engineer may not recommend further payments to the contractor until such time as full access has been provided.

3.3 PROJECT CLOSEOUT

A. The following paragraphs supplement the requirements of Division 01.

B. Final Jobsite Observation:

1. In order to prevent the Final Jobsite Observation from occurring too early, the Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.
2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review.
3. Upon Contractor certification that the project is complete and ready for a final observation, the Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
4. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

C. Before final payment is authorized, this Contractor must submit the following:

1. Operation and maintenance manuals with copies of approved shop drawings.
2. Record documents including marked-up or reproducible drawings and specifications.
3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.
4. Start-up reports on all equipment requiring a factory installation inspection or start-up.
5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Architect/Engineer required prior to final payment approval.

3.4 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. O&M file name: O&M.div23.contractor.YYYYMMDD
    b. Transmittal file name: O&Mtransmittal.div23.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copy of final approved test and balance reports.
5. Copies of all factory inspections and/or equipment startup reports.
6. Copies of warranties.
7. Schematic electrical power/controls wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
8. Dimensional drawings of equipment.
9. Capacities and utility consumption of equipment.
10. Detailed parts lists with lists of suppliers.
11. Operating procedures for each system.
12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
13. Repair procedures for major components.
14. List of lubricants in all equipment and recommended frequency of lubrication.
15. Instruction books, cards, and manuals furnished with the equipment.

3.5 INSTRUCTING THE OWNER'S REPRESENTATIVES

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.

B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

D. The instructions shall include:

1. Explanation of all air handling systems.
2. Temperature control system operation including calibration, adjustment and proper operating conditions of all sensors.
3. Maintenance of equipment.
4. Start-up procedures for all major equipment.
5. Explanation of seasonal system changes.

E. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can attend if desired.

F. Minimum hours of instruction for each item shall be:

1. Air Handling System(s) - 2hours.
2. Gas Detection Systems - 2 hours.
3. Energy Recovery Unit - 1 hour.
4. Drying Fans - 1 hour.

G. The Contractor shall prepare a detailed, written training agenda and submit it to the Architect/Engineer a minimum of two weeks prior to the formal training for approval. The written agenda shall include specific training points within the items described above. For example: how to adjust setpoints, troubleshooting, proper start-up, proper shut-down, seasonal changes, draining, venting, changing filters, changing belts, etc. Failure to provide and follow an approved training agenda may result in additional training required at the expense of the Contractor.

H. Operating Instructions:

1. Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.
2. If the Contractor does not have staff that can adequately provide the required instructions the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.6 SYSTEM STARTING AND ADJUSTING

A. The mechanical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes calibration and adjustments of all controls, noise level adjustments and final comfort adjustments as required.

B. Complete all manufacturer-recommended startup procedures and checklists to verify proper motor rotation, electrical power voltage is within equipment limitations, equipment controls maintain pressures and temperatures within acceptable ranges, all filters and protective guards are in-place, acceptable access is provided for maintenance and servicing, and equipment operation does not pose a danger to personnel or property.

C. Operate all HVAC systems continuously for at least one week prior to occupancy to bring construction materials to suitable moisture levels. Areas with mechanical cooling shall be maintained below 60% RH.

D. Contractor shall adjust the mechanical systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.

E. All operating conditions and control sequences shall be tested during the start-up period. Test all interlocks, safety shutdowns, controls, and alarms.

F. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.7 RECORD DOCUMENTS

A. The following paragraphs supplement Division 01 requirements.

B. Maintain at the job site a separate and complete set of mechanical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings to indicate revisions to piping and ductwork, size and location, both exterior and interior; including locations of coils, dampers, other control devices, filters, and other units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned from column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (e.g., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

D. Mark specifications to show approved substitutions; Change Orders, and actual equipment and materials used.

E. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

F. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

3.8 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment.

B. Clean all drain pans and areas where moisture is present. Immediately report any mold, biological growth, or water damage.

C. Remove all rust, scale, dirt, oils, stickers and thoroughly clean exterior of all exposed bare metal ductwork, piping, hangers, and accessories.

D. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.9 SPECIAL REQUIREMENTS

A. Contractor shall coordinate the installation of all equipment, valves, dampers, operators, etc., with other trades to maintain clear access area for servicing.

B. All equipment shall be installed in such a way to maximize access to parts needing service or maintenance. Review the final field location, placement, and orientation of equipment with the Owner's designated representative prior to setting equipment.

C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's designated representative will result in removal and reinstallation of the equipment at the Contractor's expense.

3.10 IAQ MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

A. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building. These measures shall include, but not be limited to:

1. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:

    a. Minimizing the amount of dust generated.
    b. Reducing solvent fumes and VOC emissions.
    c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.
    d. Protect stored on-site and installed absorptive materials from moisture damage.

2. Request that the Owner designate an IAQ representative.
3. Review and receive approval from the Owner's IAQ representative for all IAQ-related construction activities and negative pressure containment plans.
4. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.
5. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.
6. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.
7. To minimize growth of infectious organisms, do not permit damp areas in or near the construction area to remain for over 24 hours.

8. In addition to the criteria above, provide measures as recommended in the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction".
9. If permanently installed air handlers are used to serve both construction and occupied areas, all return grilles throughout construction areas shall be sealed to prevent air from construction areas being supplied to occupied areas.
10. If permanently installed air handlers are used during construction to serve only construction areas and do not supply air to adjacent occupied areas, MERV 8 filtration media shall be used to protect each return air grille or opening. The intent of this will be to prevent construction dust and debris from entering any return or supply air ductwork in the facility. All filtration media shall be replaced immediately prior to occupancy.

3.11 MAINTAINING CLEAN DUCTWORK THROUGHOUT CONSTRUCTION

A. Throughout the duration of construction, all ductwork shall be capped or sealed with sheet metal caps, polyethylene film, or other airtight protective to keep dust, dirt, and construction debris out of ducts. Similar means shall be used to seal air-side connections of HVAC equipment to include, but not limited to, air handling units, fans, terminal air boxes, fan coil units, cabinet heaters, blower coils, and the like.

B. When air terminal devices are installed, contractors shall seal all supply, return, and exhaust grilles with polyethylene film or other airtight protective to keep dust, dirt, and construction debris out of ducts.

C. Should HVAC equipment be started during construction, Contractor shall remove airtight protectives and shall install one-inch thick MERV 8 filter media over all return and exhaust grilles to prevent dust, dirt, and construction debris from entering ductwork. Filter media shall cover the entire grille face and shall be secured such that air cannot bypass filter media.

D. Should filter media become laden with dust and dirt, Contractor shall replace filter media with new media to prevent damage to air distribution system and equipment.

E. The following steps shall be taken during testing, adjusting, and balancing of each air system:

1. All construction activities in all spaces served by the air system shall stop.
2. All airtight protectives and temporary filter media shall be removed from all portions of the air system.
3. Testing, adjusting, and balancing work shall not commence until all construction activity is stopped and all airtight protectives and temporary filter media is removed.
4. Once testing, adjusting, and balancing work is complete for the air system, airtight protectives or temporary filter media shall be installed over all ductwork openings and air terminals on the air system prior to resuming construction activities in any spaces served by the air system.

F. The Owner shall agree the building is sufficiently clean prior to the removal of any filtration media and airtight protectives from air terminal devices.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. All air handling units operating and balanced.2. All fans shall be operating and balanced.
2. All miscellaneous mechanical systems (unit heaters, fan coil units, cabinet heaters, etc.) operating.
3. Pipe insulation complete, pipes labeled, and valves tagged.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

END OF SECTION 23 05 00

SECTION 23 05 05 - HVAC DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mechanical demolition.

B. Cutting and Patching.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be as specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. THE DRAWINGS ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK AND DO NOT SHOW EVERY PIPE, DUCT, OR PIECE OF EQUIPMENT THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY CONDITIONS PRIOR TO SUBMITTING A BID.

B. Where walls, ceilings, etc., are shown as being removed on general drawings, the Contractor shall remove all mechanical equipment, devices, fixtures, piping, ducts, systems, etc., from the removed area.

C. Where ceilings, walls, partitions, etc., are temporarily removed and replaced by others, This Contractor shall remove, store, and replace equipment, devices, fixtures, pipes, ducts, systems, etc.

D. Verify that abandoned utilities serve only abandoned equipment or facilities. Extend services to facilities or equipment that shall remain in operation following demolition.

E. Coordinate work with all other Contractors and the Owner. Schedule removal of equipment to avoid conflicts.

F. This Contractor shall verify all existing equipment sizes and capacities where equipment is scheduled to be replaced or modified, prior to ordering new equipment.

G. Bid submittal shall mean the Contractor has visited the project site and verified existing conditions and scope of work.

3.2 PREPARATION

A. Disconnect mechanical systems in walls, floors, and ceilings scheduled for removal.

B. Provide temporary connections to maintain existing systems in service during construction. When work must be performed on operating equipment, use personnel experienced in such operations.

3.3 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and extend existing mechanical work under provisions of Division 2 and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned ducts and piping to source of supply and/or main lines.

D. Remove exposed abandoned pipes and ducts, including abandoned pipes and ducts above accessible ceilings. Cut ducts flush with walls and floors, cap duct that remains, and patch surfaces. Cut pipes above ceilings, below floors and behind walls. Cap remaining lines. Repair building construction to match original. Remove all clamps, hangers, supports, etc. associated with pipe and duct removal.

E. Disconnect and remove mechanical devices and equipment serving equipment that has been removed.

F. Repair adjacent construction and finishes damaged during demolition and extension work.

G. Maintain access to existing mechanical installations which remain. Modify installation or provide access panels as appropriate.

H. Remove unused sections of supply and return air ductwork back to mains. Patch opening with sheet metal and seal airtight. Patch existing insulation to match existing. Where existing ductwork is to be capped and reused, locate the end cap within 6" of the last branch. End caps shall be 3" pressure class and seal class "A".

I. Extend existing installations using materials and methods compatible with existing installations, or as specified.

J. Properly reclaim and dispose of all refrigerant in demolished equipment and as required for extension of existing equipment.

3.4 CUTTING AND PATCHING

A. This Contractor is responsible for all penetrations of existing construction required to complete the work of this project. Refer to Section 23 05 29 for additional requirements.

B. Penetrations in existing construction should be reviewed carefully prior to proceeding with any work.

C. Penetrations shall be neat and clean with smooth and/or finished edges. Core drill where possible for clean opening.

D. Repair existing construction as required after penetration is complete to restore to original condition. Use similar materials and match adjacent construction unless otherwise noted or agreed to by the Architect/Engineer prior to start of work.

E. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

3.5 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Clean all systems adjacent to project which are affected by the dust and debris caused by this construction.

C. MECHANICAL ITEMS REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL DISPOSE OF MATERIAL THE OWNER DOES NOT WANT TO REUSE OR RETAIN FOR MAINTENANCE PURPOSES.

3.6 SPECIAL REQUIREMENTS

A. Install temporary filter media over outside air intakes which are within 100 feet of the limits of construction. This Contractor shall complete any cleaning required for existing systems which are affected by construction dust and debris.

B. Review locations of all new penetrations in existing floor slabs or walls. Determine construction type and review for possible interferences. Bring all concerns to the attention of the Architect/Engineer before proceeding.

END OF SECTION 23 05 05

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SECTION 23 05 53 - HVAC IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Identification of products installed under Division 23.

1.2 REFERENCES

A. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 23 05 00. Include list of items identified, wording, letter sizes, and color coding.

B. Include valve chart and schedule listing valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. 3M

B. Bunting

C. Calpico

D. Craftmark

E. Emedco

F. Kolbi Industries

G. Seton

H. W. H. Brady

I. Marking Services.

2.2 MATERIALS

A. General:

1. Plastic Nameplates: Laminated three-layer phenolic with engraved black, 1/4" minimum letters on light contrasting background.

B. Pipe Markers:

1. All pipe markers (purchased or stenciled) shall conform to ANSI A13.1. Marker lengths and letter sizes shall be at least the following:

OD of Pipe or Insulation	Marker Length	Size of Letters
Up to and including 1-1/4"	8"	1/2"
1-1/2" to 2"	8"	3/4"

Plastic tags may be used for outside diameters under 3/4"

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all products per manufacturer's recommendations.

B. Degrease and clean surfaces to receive adhesive for identification materials.

C. Valves:

1. All valves (except shutoff valves at equipment) shall have numbered tags.
2. Provide or replace numbered tags on all existing valves that are connected to new systems or that have been revised.
3. Provide all existing valves used to extend utilities to this project with numbered tags. Review tag numbering sequence with the Owner prior to ordering tags.
4. Secure tags with heavy duty key chain and brass "S" link or with mechanically fastened plastic straps.
5. Attach to handwheel or around valve stem. On lever operated valves, drill the lever to attach tags.
6. Number all tags and show the service of the pipe.
7. Provide one Plexiglas framed valve directory listing all valves, with respective tag numbers, uses and locations. Mount directory in location chosen by the Architect/Engineer.

D. Pipe Markers:

1. Adhesive Backed Markers: Use Brady Style 1, 2, or 3 on pipes 3" diameter and larger. Use Brady Style 4, 6, or 8 on pipes under 3" diameter. Similar styles by other listed manufacturers are acceptable.

E. Equipment:

1. All equipment not easily identifiable such as controls, relays, gauges, etc.; and all equipment in an area remote from its function such as air handling units, exhaust fans, filters, reheat coils, dampers, etc.; shall have nameplates or plastic tags listing name, function, and drawing symbol. Do not label exposed equipment in public areas.
2. Fasten nameplates or plastic tags with stainless steel self-tapping screws or permanently bonding cement.
3. Mechanical equipment that is not covered by the U.S. National Appliance Energy Conservation Act (NAECA) of 1987 shall carry a permanent label installed by the manufacturer stating that the equipment complies with the requirements of ASHRAE 90.1.

F. Miscellaneous:

1. Attach self-adhesive vinyl labels at all duct access doors used to reset fusible links or actuators on fire, fire/smoke, or smoke dampers. Lettering shall be a minimum of 1/2" high. Labels shall indicate damper type.
2. Provide engraved plastic tags at all hydronic or steam system make-up water meters.

3.2 SCHEDULE

A. Pipes to be marked shall be labeled with text as follows, regardless of which method or material is used:

1. REFRIGERANT LIQUID: White lettering; purple background
2. REFRIGERANT SUCTION: White lettering; purple background

END OF SECTION 23 05 53

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SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing, adjusting, and balancing of air systems.

B. Testing, adjusting, and balancing of energy recovery systems.

C. Verification of existing systems.

1.2 QUALITY ASSURANCE

A. Agency shall be a company specializing in the adjusting and balancing of systems specified in this section. Perform work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor, SMARTA Certified Air and Hydronic Balancer, or TABB Certified Supervisor.

B. Work shall be performed in accordance with the requirements of the references listed at the start of this section.

1.3 REFERENCES

A. AABC - National Standards for Total System Balance, Seventh Edition.

B. ADC - Test Code for Grilles, Registers, and Diffusers.

C. AMCA - Publication 203-90; Field Performance Measurement of Fan Systems.

D. ASHRAE - 2019 HVAC Applications Handbook; Chapter 39, Testing, Adjusting and Balancing.

E. ASHRAE/ANSI - Standard 111-2008; Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems.

F. NEBB - Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, Ninth Edition, 2019.

G. SMACNA - HVAC Systems; Testing, Adjusting and Balancing (latest edition).

H. TABB - International Standards for Environmental Systems Balance.

1.4 SUBMITTALS

A. Submit copies of report forms, balancing procedures, and the name and qualifications of testing and balancing agency for approval within 30 days after award of Contract.

B. Electronic Copies:

1. Submit a certified copy of test reports to the Architect/Engineer for approval. Electronic copies shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Copies that are not legible will be returned to the Contractor for resubmittal. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
2. Electronic file size shall be limited to a maximum of 10MB. Larger files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2", etc.
3. All text shall be searchable.
4. Bookmarks shall be used. All bookmark titles shall be an active link to the index page and index tabs.

1.5 REPORT FORMS

A. Submit reports on AABC, SMACNA or NEBB forms. Use custom forms approved by the Architect/Engineer when needed to supply specified information.

B. Include in the final report a schematic drawing showing each system component, including balancing devices, for each system. Each drawing shall be included with the test reports required for that system. The schematic drawings shall identify all testing points and cross-reference these points to the report forms and procedures.

C. Refer to PART 4 for required reports.

1.6 WARRANTY/GUARANTEE

A. The TAB Contractor shall include an extended warranty of 90 days after owner receipt of a completed balancing report, during which time the Owner may request a recheck of terminals, or resetting of any outlet, coil, or device listed in the test report. This warranty shall provide a minimum of 12 manhours of onsite service time. If it is determined that the new test results are not within the design criteria, the balancer shall rebalance the system according to design criteria.

B. Warranty/Guarantee must meet one of the following programs: TABB International Quality Assurance Program, AABC National Project Performance Guarantee, NEBB's Conformance Certification.

1.7 SCHEDULING

A. Coordinate schedule with other trades. Provide a minimum of seven days' notice to all trades and the Architect/Engineer prior to performing each test.

B. TAB shall be conducted at near peak cooling/heating times of the year.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. All procedures must conform to a published standard listed in the References article of this section. All equipment shall be adjusted in accordance with the manufacturer's recommendations. Any system not listed in this specification but installed under the contract documents shall be balanced using a procedure from a published standard listed in the References article.

B. The Balancing Contractor shall incorporate all pertinent documented construction changes (e.g. submittals/shop drawings, change orders, RFIs, ASIs, etc.) and include in the balancing report.

C. Recorded data shall represent actual measured or observed conditions.

D. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing is complete, close probe holes and patch insulation with new materials as specified. Restore vapor barrier and finish as specified.

E. Permanently mark setting of valves, dampers, and other adjustment devices allowing for settings to be restored. Set and lock memory stops.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, plugging test holes, and restoring thermostats to specified settings.

3.2 EXAMINATION

A. Before beginning work, verify that systems are complete and operable. Ensure the following:

1. General Equipment Requirements:

    a. Equipment is safe to operate and in normal condition.
    b. Equipment with moving parts is properly lubricated.
    c. Proper thermal overload protection is in place for electrical equipment.
    d. Direction of rotation of all fans is correct.
    e. Access doors are closed and end caps are in place.

2. Duct System Requirements:

    a. All filters are clean and in place. If required, install temporary media.
    b. Duct systems are clean and free of debris.
    c. Air outlets are installed and connected.
    d. Duct system leakage has been minimized.

B. Mechanical contractor shall have the commissioning scope completed per ASHRAE 90.1 (2010) prior to any TAB activities.

C. Report any defects or deficiencies to Architect/Engineer.

D. Promptly report items that are abnormal or prevent proper balancing.

E. If, for design reasons, system cannot be properly balanced, report as soon as observed.

F. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Architect/Engineer for spot checks during testing.

B. Instruments shall be calibrated within six months of testing performed for project, or more recently if recommended by the instrument manufacturer.

C. Produce a TAB plan for owner review prior to any TAB activities.

3.4 INSTALLATION TOLERANCES

A. ± 10% of scheduled values:

1. Adjust air inlets and outlets to ± 10% of scheduled values.

B. + 5% of scheduled values

1. Adjust outdoor air intakes to within + 5% of scheduled values.
2. Adjust exhaust air through energy recovery equipment to within +5% of scheduled values.

C. Adjust supply, return, and exhaust air-handling systems to +10% / -5% of scheduled values.

3.5 ADJUSTING

A. After adjustment, take measurements to verify balance has not been disrupted or that disruption has been rectified.

B. Once balancing of systems is complete, at least one damper or valve must be 100% open.

C. After testing, adjusting and balancing are complete, operate each system and randomly check measurements to verify system is operating as reported in the report. Document any discrepancies.

D. Contractor responsible for each motor shall also be responsible for replacement sheaves. Coordinate with contractor.

3.6 SUBMISSION OF REPORTS

A. Fill in test results on appropriate forms.

PART 4 - SYSTEMS TO BE TESTED, ADJUSTED AND BALANCED

4.1 Verification of existing systems.

A. Perform a pre-balance of systems serving the area of construction prior to the start of any other work. Do not make adjustments to the systems. If the systems are not operating at maximum capacity, temporarily drive system to maximum and take readings for the system. Return the system to its original state when measurements are complete.

1. Air Handling Unit (Existing F-1 and Existing ERV-1):

a. General Requirements:

1) Existing Equipment Tag (if available).
2) Location.
3) Manufacturer, model, arrangement, class, discharge.
4) Fan RPM.

b. Flow Rate:

1) Supply flow rate (cfm)
2) Return flow rate (cfm)
3) Outside flow rate (cfm)
4) Exhaust flow rate (cfm)

c. Pressure Drop and Pressure:

1) Filter pressure drop.
2) Total static pressure. (Indicate if across fan or external to unit).
3) Inlet pressure.
4) Discharge pressure.

2. Exhaust Fan

a. Drawing symbol.
b. Location.
c. Manufacturer and model.
d. Flow rate (cfm).
e. Total static pressure. (Indicate measurement locations).
f. Inlet pressure.
g. Discharge pressure.
h. Fan RPM.

3. Air Terminal (Inlet or Outlet):

a. Room number/location.
b. Terminal type and size.
c. Velocity.
d. Flow rate (cfm)
e. Percent of design flow rate.

B. Report findings to Architect/Engineer on standard forms. Provide copies of report.

4.2 GENERAL REQUIREMENTS

A. Title Page:

1. Project name.
2. Project location.
3. Project Architect.
4. Project Engineer (IMEG Corp.).
5. Project General Contractor.
6. TAB Company name, address, phone number.
7. TAB Supervisor's name and certification number.
8. TAB Supervisor's signature and date.
9. Report date.

B. Report Index

C. General Information:

1. Test conditions.

a. Outside air data at times of testing, provide two data points at a minimum to determine psychometric conditions.

b. Dates and times of testing is required.

2. Nomenclature used throughout report.
3. Notable system characteristics/discrepancies from design.
4. Test standards followed.
5. Any deficiencies noted.
6. Quality assurance statement.

D. Instrument List:

1. Instrument.
2. Manufacturer, model, and serial number.
3. Range.
4. Calibration date.

4.3 AIR SYSTEMS

A. Air Moving Equipment:

1. General Requirements:

a. Drawing symbol.
b. Location.
c. Manufacturer, model, arrangement, class, discharge.
d. Fan RPM.
e. Multiple RPM fan curve with operating point marked. (Obtain from equipment supplier).
f. Final frequency of motor at maximum flow rate (on fans driven by VFD).

2. Flow Rate:

    a. Supply flow rate (cfm): specified and actual.
    b. Return flow rate (cfm): specified and actual.
    c. Outside flow rate (cfm): specified and actual.
    d. Exhaust flow rate (cfm): specified and actual.

3. Pressure Drop and Pressure:

    a. Filter pressure drop: specified and actual.
    b. Total static pressure: specified and actual. (Indicate if across fan or external to unit).
    c. Inlet pressure.
    d. Discharge pressure.

B. Fan Data:

1. Drawing symbol.
2. Location.
3. Manufacturer and model.
4. Flow rate (cfm): specified and actual.
5. Total static pressure: specified and actual. (Indicate measurement locations).
6. Inlet pressure.
7. Discharge pressure.
8. Fan RPM.
9. Final speed controller adjustments/positions shall be documented.

C. Electric Motors:

1. Drawing symbol of equipment served.
2. Manufacturer, Model, Frame.
3. Nameplate: HP, phase, service factor, RPM, operating amps, efficiency.
4. Measured: Voltage and Amps in each phase.

D. Air Terminal (Inlet or Outlet):

1. Drawing symbol.
2. Room number/location.
3. Terminal type and size.
4. Velocity: specified and actual.
5. Flow rate (cfm): specified and actual.
6. Percent of design flow rate.

4.4 HEATING SYSTEMS

A. Heating Coils:

1. General Requirements:

    a. Drawing symbol.
    b. Service.
    c. Location.
    d. Manufacturer and model.
    e. Size.

2. Flow Rate:

    a. Flow rate (cfm): specified and actual.

3. Temperature:

    a. Entering air temperature: specified and actual.
    b. Leaving air temperature: specified and actual.

4. Pressure Drop and Pressure:

    a. Air pressure drop: specified and actual.

5. Energy:

    a. Air Btuh (cfm x temp rise x 1.09).

4.5 COOLING SYSTEMS

A. Cooling Coils:

1. General Requirements:

    a. Drawing symbol.
    b. Service.
    c. Location.
    d. Size.
    e. Manufacturer and model.

2. Temperature:

    a. Entering air DB temperature: specified and actual.
    b. Entering air WB temperature: specified and actual.
    c. Leaving air DB temperature: specified and actual.
    d. Leaving air WB temperature: specified and actual.

3. Flow Rate:

    a. Flow rate (cfm): specified and actual.

4. Pressure Drop and Pressure:

    a. Air pressure drop: specified and actual.

5. Energy:

    a. Air Btuh (cfm x enthalpy change x 4.5).

4.6 ENERGY RECOVERY SYSTEMS

A. Air Systems - Air energy recovery devices shall be tested at ambient temperatures of less than 40°F or greater than 85°F.

1. Air to Air Plate Exchanger:

a. General Requirements:

1) Drawing Symbol
2) Location.

b. Primary Air:

1) Primary Entering Air Temperature.
2) Primary Leaving Air Temperature.
3) Primary Air Flow Rate (cfm).
4) Primary Air Pressure Drop.

c. Secondary Air:

1) Secondary Entering Air Temperature.
2) Secondary Leaving Air Temperature.
3) Secondary Air Flow Rate (cfm).
4) Secondary Air Pressure Drop.

END OF SECTION 23 05 93

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SECTION 23 07 13 - DUCTWORK INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ductwork Insulation.

B. Insulation Jackets.

1.2 QUALITY ASSURANCE

A. Applicator: Company specializing in ductwork insulation application. When requested, installer shall submit manufacturer's certificate indicating qualifications.

B. Materials:

1. Listed and labeled for flame spread/smoke developed rating of no more than 25/50 when tested per ASTM E84 or UL 723 as required by code.
2. Fungal Resistance: No growth when tested in accordance with ASTM G21 (antifungal test).
3. Rated velocity on coated air side for air erosion in accordance with UL 181 at 5,000 fpm minimum.

C. Adhesives: UL listed, meeting NFPA 90A/90B requirements.

1.3 REFERENCES

A. ANSI/ASHRAE/IES Standard 90.1 - 2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. ANSI/ASTM C553 - Mineral Fiber Blanket and Felt Insulation.

C. ANSI/ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

D. ASTM E84 - Surface Burning Characteristics of Building Materials.

E. ASTM E136 - Standard Test Method for the Behavior of Materials in a Vertical Tube Furnace at 750°C.

F. ASTM E814 - Fire Tests of Through Penetrations Firestops.

G. National Commercial & Industrial Insulation Standards - 1999 Edition - as published by Midwest Insulation Contractors Association and endorsed by National Insulation Contractors Association.

H. NFPA 255 - Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Submit shop drawings per Section 23 05 00. Include product description, list of materials and thickness for each service, and location.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type A: Flexible Fiberglass - Outside Wrap; ANSI/ASTM C553; commercial grade; 0.28 / 0.26 (Out-Of-Package/Installed-Compressed 25%) maximum 'K' value at 75°F; foil scrim Kraft facing, 1.0 lb./cu. ft. density. Submit both "Out of Package" and "Installed-Compressed 25%" K and R-values.

B. Type B: Semi-rigid Fiberglass Board Wrap - Outside Application; ANSI/ASTM C612, Class 1; 0.25 maximum 'K' value at 75°F; foil scrim Kraft facing, 3 lb./cu. ft. density.

C. Type C: Flexible Fiberglass Liner; ANSI/ASTM C1071; 0.28 maximum 'K' value at 75°F; 1.5 lb/cu ft minimum density; coated air side for 5000 fpm air velocity.

2.2 JACKETS

A. Vapor Barrier Jackets: Kraft reinforced foil scrim vapor barrier with self-sealing adhesive joints. Beach puncture resistance ratio of at least 25 units. Tensile strength: 35 psi minimum. Single, self-seal acrylic adhesive on longitudinal jacket laps and butt strips.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install materials in accordance with manufacturer's instructions, codes, and industry standards.

B. Install materials after ductwork has been tested.

C. Clean surfaces for adhesives.

D. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.

E. Exterior Duct Wrap - Flexible, Type A:

1. Apply with edges tightly butted.
2. Cut slightly longer than perimeter of duct to insure full thickness at corners. Do not wrap excessively tight.
3. Seal joints with adhesive backed tape.
4. Apply so insulation conforms uniformly and firmly to duct.
5. Seal all penetrations of the vapor barrier by strap hangers or slip cable hangers with adhesive backed tape.

6. Provide high-density insulation inserts on rectangular ducts at trapeze duct hangers to prevent crushing of insulation. Provide high-density insulation inserts with clamp-on round ducts requiring two (2) rods or straps to prevent crushing of insulation. Maintain continuous vapor barrier through the hanger.
7. Tape all joints with Royal Tapes #RT 350 (216-439-7229), Venture Tape 1525CW, or Compac Type FSK. No substitutions will be accepted without written permission from the Architect/Engineer.
8. Press tape tightly to the duct covering with a squeegee for a tight continuous seal. Fish mouths and loose tape edges are not acceptable.
9. Staples may be used, but must be covered with tape.
10. Vapor barrier must be continuous.
11. Mechanically fasten on 12" centers at bottom of ducts over 24" wide and on all sides of vertical ducts.

F. Semi Rigid Fiberglass Board Wrap - Type B (Indoor Use):

1. Impale on pins welded to the duct and secured with speed clips. Clip pins off close to speed clips.
2. Space pins as needed to hold insulation firmly against duct, but not less than one pin per square foot. Pins must be long enough to avoid compressing the insulation.
3. Seal all joints and speed clips with glass fabric set in adhesive or a 3" wide strip of Royal Tapes #RT 350 (216-439-7229), Venture Tape 1525CW, or Compac Type FSK facing tape.
4. For small areas, secure insulation with adhesive over the entire surface of the duct. Use adhesive in addition to pins as needed to prevent sagging on horizontal surfaces.

G. Interior Insulation - Flexible Duct Liner, Type C:

1. Observation of Duct Lining:

    a. After installation of ductwork, Architect/Engineer may select random observation points in each system.

        1) At each observation point, cut and remove an 18" x 18" section of ductwork and liner for verification of installation.
        2) Random observation points based on one opening per 75 lineal ft. of total duct run.

    b. When any of the observation points shows non-compliance, additional points will be designated by the Architect/Engineer, and observation repeated.
    c. If 20% of points observed do not comply, remove and replace all lined ducts and repeat tests. Where replacement is not required, correct all non-compliances.
    d. At end of observation, repair all duct lining and observation holes by installing standard, insulated, hinged access doors per Section 23 33 00.
    e. Paint or finish to match adjacent duct surfaces.

2. Impale on spindle anchors welded or mechanically fastened to the duct. Adhesive or glue fastened anchors are not acceptable. Maximum anchor spacing per SMACNA Duct Construction Standards or manufacturer's recommendations, whichever is more restrictive. Locate pins less than 3" from corners and at intervals not over 6" around the perimeter at leading and trailing edges. Locate pins within 3" of transverse joints and at intervals not over 16" long the length of the duct. Pins must be long enough to prevent compressing the insulation.
3. In addition to anchors, secure liner with UL listed adhesive covering over 90% of the duct surface.
4. Install per the latest edition of the SMACNA Manual.

5. Leading edges shall be covered as follows:

    a. For duct velocities below 3000 fpm, coat leading edges with adhesive. Neatly butt liner without gaps at transverse joints. Cut liner flush with end of the duct section for tight joints with no exposed duct. If adhesive is shop installed, field apply additional adhesive to the end of each duct section for complete adhesion of the liner. Protect edges from dirt and debris.
    b. For duct velocities above 3000 fpm, cover leading edges with metal nosing. Use nosing on upstream edges of each section of duct. If the duct can be installed in either direction, provide nosing on each end or clearly mark the duct to allow visual verification after installation. Verify duct velocities based on the scheduled air flow rates and determine where metal nosing is required.
    c. Install metal nosing in the following locations (regardless of velocity):

        1) The first three fittings downstream of all fans.
        2) At all duct liner interruptions. This includes fire dampers, access doors, branch connections, and all other locations where the edge of the liner is exposed.
        3) Trailing edges of transverse joints do not require metal nosings.

6. Overlap liner at longitudinal joints. Make longitudinal joints at corners of the duct unless the duct size does not allow this. Coat longitudinal joints with adhesive at velocities over 2500 fpm.
7. Seal all damaged duct liner with adhesive and glass cloth. Do not damage duct liner surface coatings.
8. Duct dimensions given are net inside dimensions. Increase sheet metal to allow for insulation thickness.

H. Continue insulation with vapor barrier through penetrations unless code prohibits.

I. Provide 2" wide, 24" high, 26 gauge, galvanized sheet metal corner protection angles for all externally insulated ductwork extending to a floor or curb.

3.2 SCHEDULE

A. Refer to Section 23 31 00 for scheduling of insulation.

END OF SECTION 23 07 13

SECTION 23 09 00 - HAZARDOUS GAS CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Control Devices, Components, Wiring and Material.

B. Instructions for Owners.

1.2 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

B. TCC: Company specializing in the work of this section.

1.3 REFERENCES

A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.

B. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 volts Maximum).

D. ANSI/NFPA 70 - National Electrical Code.

E. ANSI/NFPA 90A - Installation of Air-Conditioning and Ventilation Systems.

F. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality.

G. ASHRAE 85 - Automatic Control Terminology for Heating, Ventilating, Air Conditioning.

1.4 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings per Section 23 05 00. In addition, submit an electronic copy of the shop drawings in Adobe Acrobat (.pdf) format to the Owner for review.
2. Product Data Sheets: Required for each component that includes: unique identification tag that is consistent throughout the submittal, manufacturer's description, technical data, performance curves, installation/maintenance instructions, and other relevant items. When manufacturer's literature applies to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

B. Factory-Mounted Components: Where control devices specified in this section are indicated to be factory mounted on equipment, arrange for shipping control devices to unit manufacturer.

1.6 SUMMARY

A. Provide new standalone gas detection system, with a Honeywell control panel, lights, and horn/strobe for this project.

B. Manually controlled two-position motor operated damper shall be interlocked with an inline exhaust fan.

1.7 JOB CONDITIONS

A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to ensure that the Work will be carried out in an orderly fashion. It is this Contractor's responsibility to check the Contract Documents for possible conflicts between the Work of this section and that of other crafts in equipment location; pipe, duct and conduit runs; electrical outlets and fixtures; air diffusers; and structural and architectural features.

PART 2 - PRODUCTS

2.1 CONTROL DAMPERS

A. Rectangular Control Dampers - Standard Construction:

1. Shall be licensed to bear the AMCA Certified Rating Seal.
2. Test leakage and pressure drop per AMCA 500.
3. Frame: Hat-shaped channel, minimum 12 gauge extruded aluminum, and minimum 4" deep. Caulk or weld seams to prevent leakage.
4. Blades: Minimum 12 gauge extruded aluminum airfoil design, minimum 6" wide, and overlapping blades and blade seals (overlapping blade seals only is unacceptable).
5. Shaft: Non-cylindrical, solid aluminum or zinc plated steel with opening in blade to match profile of shaft. Shaft shall be securely fastened to the blade and of sufficient length to mount direct-coupled actuator. Damper manufacturer shall provide drive pin extensions and outboard bearing support brackets as required.
6. Bearings: Acetal (Delrin/Celcon) inner bearing fixed to an aluminum shaft, rotating within a polycarbonate outer bearing inserted in the frame. Provide thrust bearings for vertical damper applications.
7. Blade Seals: Extruded silicone gaskets secured in an integral slot within the blade.
8. Side Seals: Stainless steel compression type or extruded silicone gasket secured in an integral slot within the frame.
9. Linkage: Shall be concealed in the frame, constructed of aluminum or corrosion-resistant zinc plated steel, and securely fastened to shaft. Blades linked for opposed operation, unless noted otherwise on the drawings. Blades shall close evenly. Use one direct-coupled actuator per damper section. Jack-shafting is not acceptable.

10. Size Limits: 48" maximum horizontal blade length, 24 square foot maximum area per damper. Total cross-sectional area of dampers in ducts shall be at least as large as the duct without the use of blank-off sections.
11. Maximum Leakage: Class 1A at 1" w.c. pressure differential for a 24" x 24" damper.
12. Maximum Pressure Drop for Opposed Blade Damper: 0.15" for 8,000 CFM through a 24" x 24" damper (2000 fpm).
13. Maximum Pressure Drop for Parallel Blade Damper: 0.08" for 8,000 CFM through a 24" x 24" damper (2000 fpm).

2.2 DAMPER ACTUATORS

A. Damper Actuators - Electronic:

1. Actuator shall be UL 873 or 60730 listed and provided with NEMA housing for applicable environment, electronic overload protection to prevent actuator damage due to over-rotation. Mount actuator by means of a V-bolt dual nut clamp with a V-shaped toothed cradle, directly couple and mount to the valve bonnet stem, or ISO-style direct-coupled mounting pad. Actuators shall be capable of being mechanically and electrically paralleled to increase torque, if required.
2. Actuators shall be warranted for a period of five (5) years from the date of production, with the first two (2) years unconditional.
3. Proportional actuator position shall be proportional to analog or pulse width modulating signal from electronic control system.
4. Fail-Safe Dampers: Where shown on the drawings or sequences, fail-safe mechanism shall operate the damper to the fail position following power interruption.

    a. Mechanical/Spring: Mechanical spring return mechanism to drive controlled drive to an end position (open or close) on loss of power.
    b. Electronic: Electronic fail-safe shall incorporate an active balancing circuit to maintain equal charging rates among the capacitors. The power fail position shall be proportionally adjustable between 0 to 100% in 10 percent increments with a 2 second operational delay.

2.3 CONTROL INSTRUMENTATION

A. Combination Carbon Monoxide/Nitrogen Dioxide Sensors:

1. Solid-state gas sensor/transmitter for each gas, NEMA 1 gasketed enclosure, normal operating temperature 0-120°F, normal relative humidity operation 5-95%, ± 0.05% accuracy, and detection range of 0-200 ppm, 1 ppm at least resolution (CO) and detection range of 0-10 ppm, at least 0.1 ppm resolution (NO2).
2. Refer to M04.00 - HVAC Controls for local alarm and horn/strobe requirements at specific ppm levels.
3. Install in accordance with OSHA requirements.
4. Unit shall be factory calibrated and shall be re-calibrated after installation per manufacturer's recommendations.
5. Provide with horn alarm and strobe on wall next to wall mounted controller.
6. Provide NEMA 1 enclosure for controls and alarm/strobe devices.
7. System shall be stand alone, no DDC system existing.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install system and materials in accordance with manufacturer's instructions.

B. Install all operators, sensors, and control devices where accessible for service, adjustment, calibration, and repair. Do not install devices where blocked by piping or ductwork. Devices with manual reset or limit adjustments shall be installed below 6'-0" if practical to allow inspection without using a ladder.

C. Verify locations of wall-mounted devices (such as thermostats, temperature and humidity sensors, and other exposed sensors) with drawings and room details before installation. Coordinate mounting heights to be consistent with other wall-mounted devices. Maximum height above finished floor shall not exceed ADA mounting requirements.

D. Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron supports. One cabinet may accommodate more than one system in same equipment room.

E. After completion of installation, test and adjust control equipment.

F. Check calibration of instruments. Recalibrate or replace.

G. Furnish and install conduit, wire, and cable per the National Electric Code, unless noted otherwise in this section.

H. Remodeling:

1. All room devices as indicated on the drawings shall be removed by this Contractor. The Contractor shall also prepare the wall for finishes. Preparing the wall shall include patching old anchor holes (after the anchoring device has been removed) and sanding the wall to remove old paint outlines remaining from original devices. The wall shall be painted to match the existing wall prior to the installation of the new room device. If wall covering requires patching, the Contractor shall furnish new wall covering to match existing. If new wall covering is not available to match existing, the Contractor shall furnish a white acrylic or Plexiglas plate, 1/4" thick and sized to cover the void.

3.2 PREPARATION FOR BALANCING

A. Verify that all dampers are in the position indicated by the controller (e.g., open, closed or modulating).

B. Check the calibration and setpoints of all controllers.

C. Check the locations of all thermostats and humidistats for potential erratic operation from outside influences such as sunlight, drafts, or cold walls.

D. Verify the operation of all interlock systems.

3.3 TEST AND BALANCE COORDINATION

A. The Contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.

B. The tools used during the test and balance process shall be returned at the completion of the testing and balancing.

END OF SECTION 23 09 00

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SECTION 23 31 00 - DUCTWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Galvanized Ductwork

B. Ductwork Sealants

C. Rectangular Ductwork

D. Round and Flat Oval Ductwork

E. Ductwork Penetrations

1.2 REFERENCES: Conform to all applicable requirements of the following publications:

A. ADC Flexible Duct Performance and Installation Standards, 3rd Edition 1996.

B. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

C. ASHRAE - Handbook 2022 Systems and Equipment; Chapter 19 - Duct Construction.

D. ASHRAE - Handbook 2021 Fundamentals; Chapter 21 - Duct Design.

E. ASTM A90 - Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

F. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM A924 - Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. ASTM E90-02 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

I. ASTM E413-87 - Classification for Rating Sound Insulation.

J. AWS D9.1M/D9.1 - Sheet Metal Welding Code.

K. NFPA 90A - Installation of Air-Conditioning and Ventilating Systems.

L. NFPA 90B - Installation of Warm Air Heating and Air- Conditioning Systems.

M. SMACNA - Air Duct Leakage Test Manual.

N. SMACNA - HVAC Duct Construction Standards.

O. SMACNA - Round Industrial Duct Construction Standards - 1999 Edition.

P. UL 181 - Factory-Made Air Ducts and Air Connectors.

Q. UL 181A - Closure Systems for Use with Rigid Air Ducts and Air Connectors

R. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors.

1.3 SUBMITTALS

A. Submit shop drawings per Section 23 05 00.

B. Submit duct fabrication standards in compliance with SMACNA and these specifications. Clearly indicate metal gauges, reinforcement, and joining methods intended for use for each pressure classification. Furnish details of all common duct fittings and joint connections to be used on this project.

1.4 DEFINITIONS

A. Duct Sizes shown on drawings are inside clear dimensions. Maintain clear dimensions inside any lining.

B. Transitions are generally not shown in single-line ductwork. Where sizes change at a divided flow fitting, the larger size shall continue through the fitting.

C. Interior Duct: Ductwork located within the conditioned envelope including return air plenums and indirectly conditioned spaces.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS AND SUPPORTS

A. Rectangular Duct - Single Wall:

1. General Requirements:

a. All ductwork gauges and reinforcements shall be as listed in SMACNA Duct Construction Standards Chapter 2. Where necessary to fit in confined spaces, furnish heaviest duct gauge and least space consuming reinforcement.
b. Transitions shall not exceed the angles in Figure 4-7.

2. Exceptions and modifications to the 2005 HVAC Duct Construction Standards are:

a. All ducts shall be cross-broken or beaded.
b. Snap lock seams are not permitted.
c. Turning vanes shall be used in all 90°° mitered elbows, unless clearly noted otherwise on the drawings. Vanes shall be as follows:

1) Type 1:

a) Description: Single wall type with 22-gauge (0.029") or heavier vanes, 3-1/4" blade spacing, and 4" to 4-1/2" radius. Vanes hemmed if recommended by runner manufacturer. Runners shall have extra-long

locking tabs. C-value independently tested at below 0.26. EZ Rail II by Sheet Metal Connectors or equal.

b) Usage: Limited to 3,000 fpm and vane lengths 36" and under.

2) Type 2:

a) Description: Double wall type with 3-1/4" blade spacing, 4-1/2" radius, 24-gauge minimum, and SMACNA Type 1 runners. C-value below 0.27.

b) Usage: No limits other than imposed by the manufacturer. Provide intermediate support for vanes over 48" long.

3) Type 3 (acoustical - where acoustical lagging is located or as noted on drawings):

a) Description: Same as Type 2, except filled with fiberglass and with slotted or perforated inner curve. Minimum insertion loss of 9 dB at 250 Hz and 6 dB at 1 KHz.

b) Usage: No limits other than imposed by the manufacturer. Provide intermediate support for vanes over 48" long.

4) Turning vanes shall operate quietly. Repair or replace vanes that rattle or flutter.

5) Runners must be installed at a 45°° angle. Elbows with different size inlet and outlet must be radius type.

6) Omitting every other vane is prohibited.

d. Where smooth radius rectangular elbows are shown, they shall be constructed per SMACNA Figure 4-2. Type RE1 shall be constructed with a centerline duct radius R/W of 1.0. Where shown on drawings, Type RE3 elbows with 3 vanes shall be used with centerline duct radius R/W of 0.6 (SMACNA r/W=0.1). RE1 or RE3 elbows may be used where mitered elbows are shown if space permits. Mitered elbows (with or without turning vanes) may not be substituted for radius elbows. Do not make branch takeoffs within 4 duct diameters on the side of the duct downstream from the inside radius of radius elbows.

e. Bellmouth fittings shown on return duct inlets shall expand at a 60-degree total angle horizontally and vertically (space permitting) and have length of at least 25% of the smallest duct dimension.

f. Round taps off rectangular unlined ducts shall be flanged conical or bellmouth type (equal to Buckley Bellmouth or Sheet Metal Connectors E-Z Tap), or 45°° rectangular with transition to round (equal to Sheet Metal Connectors Inc. High Efficiency Takeoff). Straight taps are acceptable if pressure class is 1" or less, round duct is 12" diameter or less, and the tap is not located between fans and TAB devices.

g. Duct offsets shall be constructed as shown on drawings. Additional offsets required in the field shall be formed of mitered elbows without turning vanes for offsets up to 30°° maximum angle in accordance with SMACNA offset Type 2. Offsets of greater than 30°° angle shall be formed of radius elbows with centerline radius R/W=1.0 or greater. SMACNA Type 1 offsets are not permitted.

h. All lined duct shall utilize dovetail joints where round or conical taps occur. The dovetail joints shall extend past the liner before being folded over.

i. Cushion heads are acceptable only downstream of TAB devices in ducts up to ± 2" pressure class, and must be less than 6" in length.

j. Slide-on flanged transverse joint systems are acceptable provided they are a manufactured product that has been tested for conformance with Chapter 2 of the SMACNA HVAC Duct Construction Standards for sheet and joint deflection at the specified pressure class.

1) Apply sealant to all inside corners. Holes at corners are not acceptable.
2) Manufacturers:

a) Ductmate Industries - 25/35/45
b) Nexus
c) Mez
d) WDCI
e) Other manufacturers must submit test data and fabrication standards and receive Architect/Engineer's approval before any fabrication begins.

B. Round and Flat Oval Spiral Seam Ductwork - Single Wall:

1. Conform to applicable portions of Rectangular Duct Section. Round or flat oval ductwork may be substituted for rectangular ductwork where approved by the Architect/Engineer. The spiral seam ductwork shall meet the standards set forth in this specification. The ductwork shall meet or exceed the specified cross-sectional area and insulation requirements. The substitution shall be coordinated with all other trades prior to installation.
2. 90°° elbows shall be smooth radius or have a minimum of five sections with mitered joints and R/D of at least 1.5.
3. Duct and fittings shall meet the required minimum gauges listed in chapter 3 of the SMACNA requirements for the specified pressure class. Ribbed and lightweight duct are not permitted.
4. Divided flow fittings may be made as separate fittings or factory installed taps with sound, airtight, continuous welds at intersection of fitting body and tap.
5. Spot weld and bond all fitting seams in the pressure shell. Coat galvanizing damaged by welding with corrosion resistant paint to match galvanized duct color.
6. Ducts with minor axis less than 22" shall be spiral seam type. Larger ducts may be rolled, longitudinal welded seam type. SMACNA seams RL-2 and RL-3 are not permitted.
7. Reinforce flat oval ducts with external angles. Internal tie rods are permitted only as indicated for rectangular ductwork.
8. Transverse Joint Connections:

a. Crimped joints are not permitted.
b. Ducts and fittings 36" in diameter and smaller shall have slip joint connections. Size fitting ends to slip inside mating duct sections with minimum 2-inch insertion length and a stop bead. Use inside slip couplings for duct-to-duct joints, and outside slip couplings for fitting-to-fitting joints.
c. Ducts and fittings larger than 36" shall have flanged connections.
d. Secure all joints with at least 3 sheet metal screws before sealing.
e. Manufacturers, Slide-on Flanges:

1) Ductmate Industries - SpiralMate
2) Accuflange
3) Sheet Metal Connectors are acceptable.

f. Manufacturers, Self-Sealing Duct Systems:

1) Lindab
2) Ward "Keating Coupling"

C. Hangers and Supports General Requirements:

1. Hanger and support materials shall be as defined within Materials and Application Specific section below.
2. Strap Hangers: Strap hanger shall be a minimum of 1 inch, 18 gauge attached to the bottom of ducts.
3. Cable Hangers:

    a. Aircraft cable and slip cable hangers are acceptable for ducts up to 18" diameter. Protective sleeve tubing shall be used on the cable when supporting duct with exterior insulation. Corner saddles are required when supporting rectangular ductwork.

4. Integral Corner Connector Hanger: Integral hanger and corner assembly for use with TDC/TDF style duct flanges. Die stamped offset hanger connects to the flanged corner assembly. For use with aircraft cable or 1/4" or 3/8" diameter threaded rods. Tested to hold up to 1,400 lbs.. Install per manufacturer's ratings and instructions.

2.2 MATERIAL AND APPLICATION SPECIFIC

A. Galvanized Steel:

1. General Requirements:

    a. Duct and reinforcement materials shall conform to ASTM A653 and A924.
    b. Interior Ductwork and reinforcements: G60 galvanized (0.60 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise.
    c. Exterior Ductwork: G90 galvanized (0.90 ounces per square foot total zinc coating for two sides per ASTM A90) unless noted otherwise. G60 is not acceptable for exterior use.
    d. Ductwork reinforcement shall be of galvanized steel.

2. Duct Hangers and Support Material:

    a. Ductwork hangers and supports shall be of galvanized or painted steel.
    b. All fasteners shall be galvanized or cadmium plated.

2.3 DUCTWORK SEALANTS

A. One-part joint sealers shall be water-based mastic systems that meet the following requirements: maximum 48-hour cure time, service temperature of -20°F to +175°F, resistant to mold, mildew and water, flame spread rating below 25 and smoke-developed rating below 50 when tested in accordance with ASTM E84, suitable for all SMACNA seal classes and pressure classes. Mastic used to seal flexible ductwork shall be marked UL 181B-M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide openings in ducts for thermometers and controllers.

B. Locate ducts with space around equipment for normal operation and maintenance.

C. Do not install ducts or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the electrical equipment. Unless intended to serve these rooms, do not install any ductwork or equipment in electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms.

D. Provide temporary closures of metal or taped polyethylene on open ducts to prevent dust from entering ductwork.

E. Repair all duct insulation and liner tears.

F. Install manual volume dampers in branch supply ducts so all outlets can be adjusted. Do not install dampers at air terminal device or in outlets, unless specifically shown.

G. All duct support shall extend directly to building structure. Do not support ductwork from pipe hangers unless coordinated with piping contractor prior to installation. Do not allow lighting or ceiling supports to be hung from ductwork or ductwork supports.

3.2 DUCTWORK APPLICATION SCHEDULE

A. Refer to Ductwork Application Schedule below for specific requirements for system, material, shape, pressure class, seal class and insulation application.

B. Constant Volume from Fan to Outlet:

1. Shape:

    a. Rectangular Duct - Single Wall
    b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: +2"
4. Seal Class: A
5. Insulation:

    a. ASHRAE 90.1-2010: 1-1/2" thick Type A (R=4.5)

6. Additional Requirements: None

C. Return Duct:

1. Shape:

    a. Rectangular Duct - Single Wall
    b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: -2"
4. Seal Class: A
5. Insulation:

    a. ASHRAE 90.1-2010: None

6. Additional Requirements: None

D. General Exhaust Duct:

1. Shape:

    a. Rectangular Duct - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: -2"
4. Seal Class: A
5. Insulation: None
6. Additional Requirements: None

E. ERV Exhaust Air Duct:

1. Shape:

    a. Rectangular Duct - Single Wall
    b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: +2"
4. Seal Class: A
5. ASHRAE 90.1-2010

    a. Insulation: 1" thick Type C (R=3.6)

6. Additional Requirements: None.

F. Relief/Exhaust Air Duct from Fan to Exhaust Outlet:

1. Shape:

    a. Rectangular Duct - Single Wall
    b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: +2"
4. Seal Class: A
5. Insulation:

    a. ASHRAE 90.1-2010: 1-1/2" thick Type A (R=4.5)

G. Outside Air Intake from Louver to Heating Coil:

1. Shape:

    a. Rectangular Duct - Single Wall
    b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: -2"
4. Seal Class: A
5. Insulation: 1 1/2" thick Type B (R=6.0)

H. Tempered Outdoor Air Duct from Fan to Outlet:

1. Shape:

a. Rectangular Duct - Single Wall
b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: +2"
4. Seal Class: A
5. Insulation:

a. ASHRAE 90.1-2010: 1-1/2" thick Type A (R=4.5)

I. Relief Air Louver to Backdraft Damper:

1. Shape:

a. Rectangular Duct - Single Wall
b. Round and Flat Oval Spiral Seam Ductwork - Single Wall

2. Material: Galvanized Steel
3. Pressure Class: +2"
4. Seal Class: A
5. Insulation:

a. ASHRAE 90.1-2010: 1 1/2" thick Type B (R=6.0)

3.3 SPECIAL INSULATION REQUIREMENTS

A. Ductwork Accessories (Fabric Flex Connectors, Equipment Flanges, etc.):

1. Insulation:

a. ASHRAE 90.1-2010: 1-1/2" thick Type A (R=4.5)

3.4 DUCTWORK SEALING

A. General Requirements:

1. Openings, such as rotating shafts, shall be sealed with bushings or similar.
2. All connections shall be sealed including, but not limited to, taps, other branch connections, access doors, access panels, and duct connections to equipment. Sealing that would void product listings is not required. Spiral lock seams need not be sealed.
3. Mastic-based duct sealants shall be applied to joints and seams in minimum 3 inch wide by 20 mil thick bands using brush, putty knife, trowel, or spray, unless manufacturer's data sheet specifies other application methods or requirements.

B. All ducts systems, regardless of pressure class, shall be Seal Class A as defined by Section 5-1 of SMACNA HVAC Air Duct Leakage Test Manual per the Energy Code, unless specifically noted otherwise. Seal Class A shall include sealing of all transverse joints, longitudinal seams, and duct wall penetrations with welds, gaskets, mastics, or fabric-embedded mastic system. Joints are inclusive of, but not limited to, girth joints, branch and sub-branch intersections, duct collar tap-ins, fitting subsections, louver and air terminal connections to ducts, access door and access panel frames and jambs, duct, plenum, and casing abutments to building structures.

3.5 DUCTWORK PENETRATIONS

A. All duct penetrations of firewalls shall have fire or fire/smoke dampers where required by code.

B. Dampers shall be compatible with fire rating of wall assembly. Verify actual rating of any wall being penetrated with Architect/Engineer.

C. Seal all duct penetrations of walls that are not fire rated by caulking or packing with fiberglass. Install trim strip to cover vacant space and raw construction edges of all openings in finished rooms. Install escutcheon ring at all round duct openings in finished rooms. Trim strips and rings shall be same material and finish as exposed duct.

END OF SECTION 23 31 00

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SECTION 23 33 00 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual Volume Dampers.

B. Fabric Connectors.

C. Duct Test Holes.

1.2 REFERENCES

A. ASTM E477-20 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.

B. NFPA 72 - National Fire Alarm and Signaling Code

C. NFPA 90A - Installation of Air-Conditioning and Ventilating Systems.

D. SMACNA - HVAC Duct Construction Standards (latest edition).

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 23 05 00.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 MANUAL VOLUME DAMPERS

A. Fabricate in accordance with SMACNA Duct Construction Standards, and as indicated.

B. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inches.

C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12" x 72". Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide molded synthetic or oil-impregnated nylon or sintered bronze bearings.

E. Provide locking quadrant regulators on single and multi-blade dampers.

F. On insulated ducts, mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

G. If blades are in open position and extend into the main duct, mount damper so blades are parallel to airflow.

H. Contractor assembled modular manual dampers are acceptable as long as they contain the components listed above.

2.2 FABRIC CONNECTORS

A. Fabric connectors shall be installed between all fans or fan units and metal ducts or casings to prevent transfer of fan or motor vibration.

B. The fabric connectors shall be completely flexible material which shall be in folds and not drawn tight.

C. Fabric connectors shall be of glass fabric double coated with neoprene, with UL approval. Weight = 30 oz. per square yard minimum. Fabric shall not be affected by mildew and shall be absolutely waterproof, airtight and resistant to acids, alkalis, grease and gasoline, and shall be noncombustible.

D. Fabric connections shall not exceed 6" in length on ductwork that has a positive pressure. On ductwork that has a negative pressure, the length shall not exceed 2" in length.

E. All corners shall be folded, sealed with mastic and stapled on 1" centers.

F. Fabric connectors shall not be painted.

G. Unless otherwise shown on the drawings, the fabric connection at the inlet to centrifugal fans shall be at least one duct diameter from the fan to prevent inlet turbulence.

H. Materials:

1. Durodyne MFN-4-100
2. Vent Fabrics, Inc.
3. "Ventglas"
4. Proflex PFC3NGA

2.3 DUCT ACCESS DOORS

A. Fabricate per Fig. 7-2 and 7-3 of the SMACNA HVAC Duct Construction Standards and as indicated.

B. Review locations prior to fabrication. Install access doors at motorized dampers, louvers, duct coils and other equipment requiring service inside the duct.

C. Construction shall be suitable for the pressure class of the duct. Fabricate rigid, airtight, and close-fitting doors of materials identical to adjacent ductwork with sealing gaskets butt or piano hinges, and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

D. Access doors with sheet metal screw fasteners are not acceptable.

E. Minimum size for access doors shall be 24" x 16" or full duct size, whichever is less.

2.4 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Install accessories in accordance with manufacturer's instructions.
2. Where duct access doors are located above inaccessible ceilings, provide ceiling access doors. Coordinate location with the Architect/Engineer.
3. Coordinate and install access doors provided by others.
4. Provide duct test holes where indicated and as required for testing and balancing purposes.

B. Manual Volume Damper:

1. Provide manual volume dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts where indicated on drawings and as required for air balancing. Use splitter dampers only where indicated.

C. Control Dampers:

1. Provide duct access door at each control damper.

END OF SECTION 23 33 00

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SECTION 23 34 23 - POWER VENTILATORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. In-Line Cabinet Fan.

B. Micro-Drying Fan.

1.2 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300.

C. Fabrication: Conform to AMCA 99.

1.3 REFERENCES

A. AMCA 99 - Standards Handbook.

B. AMCA 208 - Calculation of the Fan Energy Index (FEI).

C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

D. AMCA 230 - AMCA 230 - Laboratory Methods of Testing Air Circulating Fans for Rating and Certification.

E. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

F. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

G. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

H. ANSI/AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

I. SMACNA - HVAC Duct Construction Standards (latest edition).

1.4 SUBMITTALS

A. Submit shop drawings per Section 23 05 00. Include data on all fans and accessories. Submit sound power levels for both fan inlet and outlet at rated capacity. Submit motor ratings and electrical characteristics, plus motor and electrical accessories. Submit multi-speed fan curves including minimum and maximum fan speed with specified operating points clearly plotted. Submit the Fan Energy Index (FEI) at the selected duty point (ceiling and HVLS fans are exempt from FEI submittal requirements).

B. Submit manufacturer's installation instructions.

C. Submit electrical power/controls wiring diagrams and product data indicating general assembly, components, safety controls, and service connections.

PART 2 - PRODUCTS

2.1 IN-LINE CABINET FAN

A. Fiberglass lined, sheet metal housing, arranged for in-line installation.

B. Rubber torsion motor mounts.

C. Manual Motor Starter: NEMA ICS 2; AC general-purpose Class A manually operated non-reversing full-voltage controller for fractional horsepower induction motors, with thermal overload relay, toggle operator.

D. Built-in backdraft damper.

E. Centrifugal fan.

F. Provide variable speed controller if shown on the drawings.

G. Manufacturers:

1. ACME
2. Broan
3. Carnes
4. Cook
5. Jenco
6. PennBarry
7. Greenheck
8. Soler-Palau
9. York

2.2 MICRO-DRYING FAN

A. Spot drying fan diameter, with enclosed motor and fan wheel and mounting accessories.

B. Housing: Double wall, UV-resistant plastic with intake grille.

C. Motor: Electrically commutated motor (ECM), permanently lubricated bearings, with thermal overload protection.

D. Fan Wheel: Composite or plastic fan wheel. Statically and dynamically balanced. Sealed lifetime lubricated bearings.

E. Support: Mounting hardware with cable tether.

F. Color: White.

G. Accessories:

1. 6 foot 3-prong cord and plug.

H. Controls:

1. Potentiometer for manual speed control.

I. Electrical: Disconnect provided by Electrical Contractor.

J. Sound: No greater than 40 dBA at 20 feet.

K. Acceptable Manufacturer:

1. Airius
2. ZOO Fan

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. If manufacturer has no recommendations, secure roof exhaust fans to curbs with 1/4" lag bolts on 8" maximum centers.

C. MC shall install and wire factory provided damper to open when the fan runs if the manufacturer does not provide an option to pre-wire the damper.

END OF SECTION 23 34 23

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SECTION 23 37 00 - AIR INLETS AND OUTLETS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grilles And Registers.

B. Louvers.

1.2 QUALITY ASSURANCE

A. Test and rate performance of air inlets and outlets per ASHRAE 70.

B. Test and rate performance of louvers per AMCA 500L-99.

C. All air handling and distribution equipment mounted outdoors shall be designed to prevent rain intrusion into the airstream when tested at design airflow and with no airflow, using the rain test apparatus described in Section 58 of UL 1995.

1.3 REFERENCES

A. AMCA 500-L-12 - Laboratory Methods of Testing Louvers for Rating.

B. ANSI/ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Inlets and Outlets.

C. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. SMACNA - Duct Construction Standards.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 23 05 00.

B. Submit schedule of inlets and outlets indicating type, size, location, application, and noise level.

C. Review requirements of inlets and outlets as to size, finish, and type of mounting prior to submitting product data and schedules of inlets and outlets.

D. Submit manufacturer's installation instructions.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

B. Conform to ASHRAE 90.1.

PART 2 - PRODUCTS

2.1 AIR TERMINALS - GRILLES AND REGISTERS

A. Reference to a grille means an air supply, exhaust or transfer device without a damper.

B. Reference to a register means an air supply, exhaust or transfer device with a damper.

C. The type of unit, margin, material, finish, etc., shall be as shown on the drawing schedule and suitable for the intended use.

D. All margins shall be compatible with ceiling types specified (including 'Thin-Line' T-bar lay-in grid system). Any discrepancies in contract documents shall be brought to the attention of the Architect/Engineer, in writing, prior to Bid Date. Submission of Bid indicates ceiling and air inlet and outlet types have been coordinated.

E. The capacity and size of the unit shall be as shown on the drawings.

F. All units shall handle the indicated cfm as shown on the drawings while not exceeding an NC level of 25, referenced to 10-12 watts with a 10 dB room effect.

G. Refer to the drawings for construction material, color and finish, margin style, deflection, and sizes of grilles and registers.

H. Provide with 3/4" blade spacing. Blades shall have steel friction pivots to allow for blade adjustment, plastic pivots are not acceptable.

I. Aluminum grilles and registers shall have staked corners before painting.

J. Where specified to serve registers, provide opposed blade volume dampers operable from the face of the register.

K. Screw holes for surface fasteners shall be countersunk for a neat appearance. Provide concealed fasteners for installation in lay-in ceilings and as specified on the drawings.

L. Manufacturers:

1. Tuttle & Bailey
2. Titus
3. Price
4. Nailor
5. Carnes
6. Metalaire
7. Krueger
8. Anemostat
9. Raymon Donco

2.2 LOUVERS - FIXED - ALUMINUM

A. Louvers shall be minimum 4" deep and constructed of extruded aluminum. Blade, jamb and sill thickness shall be minimum 0.081". Blades shall be spaced at a maximum of 5.1" apart.

B. Louvers shall be of the drainable blade design with water collected on the leading edge of the blade and diverted to the jamb.

C. Louvers shall be furnished with aluminum bird screen mounted on the inside surface.

D. Size, cfm, finish and pressure drop for louvers shall be as scheduled on the drawings.

E. AMCA Certified performance for 48" x 48" samples with intake airflow of 8,000 cfm shall not exhibit more than 0.19" pressure drop. Maximum water penetration shall be 0.01 ounces per square foot at the scheduled intake velocity based on 15 minute test duration when subjected to a water flow rate of 0.25 gal/min as described under the Water Penetration Test in AMCA 500-L-07.

F. Contractor shall provide the General Contractor with the correct sizes and locations of all louvers required in masonry walls.

G. Louvers shall be sealed around perimeter to avoid moisture penetration between the louver frame and wall.

H. Louvers shall be suitable for duct connection.

I. Manufacturers:

1. Air Flow - "EA-403"
2. Arrow - "EA-415-D"
3. American Warming & Ventilating - "LE-21"
4. Construction Specialties - "A4097"
5. Dowco - "DBE-4"
6. Louvers & Dampers, Inc. - "IL-23"
7. Ruskin - "ELF375DX"
8. Vent Products - "2760"
9. Greenheck - ESD "403"
10. Pottorff - EFD
11. United Enertech FL-D-4

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Install items in accordance with manufacturers' instructions.
2. Check location of inlets and outlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.
3. Install diffusers to ductwork with air tight connections.
4. Flexible ducts shall NOT be joined to flat-oval connections. Provide sheet metal oval-to-round transitions where required.
5. Supply grille and register blades shall be aimed in the field to provide adequate air distribution in the space. All return grilles and registers blades shall be oriented to minimize sight distance beyond installed device.

B. Volume Damper:

1. Provide manual volume dampers on duct take-off to diffusers when there are multiple connections to a common duct. Locate volume dampers as far as possible from the air inlet or outlet.

C. Maintaining Duct Cleanliness:

1. When grilles, registers, and diffusers are installed, Contractor shall prevent construction dust, dirt, and debris from entering ductwork as required by Section 23 05 00.

END OF SECTION 23 37 00

SECTION 23 40 00 - AIR CLEANING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Filters and Filter Media.

1.2 QUALITY ASSURANCE

A. Filter media shall be tested under ANSI/UL 900 and labeled.

B. Provide all filters and filter banks by one manufacturer.

1.3 REFERENCES

A. ANSI/UL 586 - Test Performance of High Efficiency Particulate, Air Filter Units.

B. ANSI/UL 900 - Test Performance of Air Filter Units.

C. ASHRAE 26 - Guideline for Field Testing of General Ventilation Devices and Systems for Removal Efficiency In-Situ by Particle Size and Resistance to Flow.

D. ASHRAE 52.2 - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

E. ANSI/NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

A. Submit shop drawings per Section 23 05 00. Include data on media, performance, assembly and frames.

1.5 EXTRA STOCK

A. Provide a total of three (3) sets of filters for all units.

1. Provide clean filters in all units at time of installation.
2. Provide clean filters in all units at project final completion after all interior finishes are complete.
3. Provide one additional set of replacement filters for all units. Deliver to Owner at job site.

PART 2 - PRODUCTS

2.1 MERV 13 (85% EFFICIENT) RIGID FILTER - DISPOSABLE - TYPE F

A. Pleated, rigid, disposable type with high density, fine fiberglass laminated to non-woven synthetic backing. Welded wire grid media support bonded to the filter media. Galvanized steel enclosing frame bonded to media periphery to eliminate air bypass.

B. 2" thick cartridges with at least 14.5 square feet of media per square foot of face area.

C. MERV 13 per ASHRAE 52.2. Maximum 0.60" WG initial resistance at 500 fpm face velocity.

D. Manufacturers:

1. Camfil
2. American Air Filter

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all products per manufacturers' instructions.

B. Seal filter media to prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

C. Do not operate fan systems without filters.

D. Install static pressure tips upstream and downstream of filters. Mount filter gauges on outside of filter housing or filter plenum, in accessible position. Adjust and calibrate. Every filter bank, including packaged units, shall have a filter gauge.

E. Install four (4) high efficiency filter test holes, two upstream and two downstream, at all high efficiency filter banks in air handling units and ductwork (85% efficiency and higher). Coordinate location of test holes with Owner.

END OF SECTION 23 40 00

SECTION 23 54 00 - FORCED AIR FURNACES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Forced Air Furnaces.

B. Refrigerant Cooling Coil and Condensing Unit.

C. Controls.

1.2 QUALITY ASSURANCE

A. Conform to requirements of UL and applicable codes.

B. Cooling system tested and rated per AHRI Standard 210.

C. Conform to ASHRAE 90.1.

1.3 REFERENCES

A. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

B. AHRI 210 - Standard for Unitary Air-Conditioning Equipment.

1.4 SUBMITTALS

A. Submit shop drawings and product data per Section 23 05 00 showing dimensions, connections, arrangement, accessories, and controls.

B. Submit manufacturer's installation instructions.

C. Submit manufacturer's descriptive literature, operating instructions, and maintenance and repair data.

D. Submit electrical power/controls wiring diagrams and product data indicating general assembly, components, safety controls, and service connections.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Bryant

B. Carrier

C. Lennox

D. Trane

E. Daikin

F. Rheem

2.2 TYPE

A. Provide upflow type with gas burner (F-1), electric heating elements (F-5), and electric refrigeration.

B. Provide self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner or heater, controls, air filter, refrigerant cooling coil and outdoor package containing compressor, condenser coil and condenser fan.

2.3 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors, glass fiber insulation and reflective liner.

B. Combustion Chamber: Welded stainless steel.

C. Supply Fan: Centrifugal type, rubber mounted with direct drive, rubber isolated 1750 rpm, 4-speed motor.

D. Air Filters: MERV 13 filter rack to be field fabricated external to the unit.

2.4 BURNER (F-1)

A. Performance: Minimum 95% efficiency natural gas burner. Refer to mechanical schedules for capacity and type.

B. Gas Burner: Condensing sealed combustion type, combustion gas valve and pressure regulator incorporating manual shutoff, standing pilot, pilot valve, automatic 100% shutoff, and thermocouple pilot safety device. 90% minimum efficiency.

C. Gas Burner Safety Controls: Thermocouple sensor prevents opening solenoid gas valve until pilot flame is proven and stops gas flow on ignition failure.

2.5 OPERATING CONTROLS

A. Provide low voltage, adjustable room thermostats to control burner operation.

B. Provide high limit control, with fixed stop at maximum permissible setting, to de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.

C. Control supply fan based on bonnet temperature independent of burner controls. Include manual switch for continuous fan operation.

2.6 ELECTRIC HEATER (Furnace F-5)

A. Finned tube metal sheath heating elements, solid-state control with built-in zero-cross switching silicone controlled rectifier (SCR) with protection against no or low airflow, shorts, grounds, and failure of protection devices.

2.7 ELECTRIC HEATER OPERATING CONTROLS

A. Low voltage room thermostat energizes heater stages in sequence with fixed delay between stages.

B. High limit temperature control de-energizes heating elements.

C. Supply fan starts before electric elements are energized and continues operating after thermostat is satisfied until bonnet temperature reaches minimum setting. Include manual switch for continuous fan operation.

2.8 DRAFT CONTROL

A. Provide each furnace with PVC combustion air inlet and CPVC outlet piping.

B. Provide induced draft blower. Pressure switch prove blower operation before allowing gas valve to open. Draft blower shall only operate during heating cycle.

2.9 EVAPORATOR COIL

A. Mount in furnace supply plenum, copper tube, aluminum fin, coil assembly, and refrigerant piping connections.

B. Install a drain pan under each cooling coil per ASHRAE 62.1. Extend drain pans the entire width of each coil, including piping and header if in the air stream, and from the upstream face of each coil to a distance 1/2 of the vertical coil height downstream from the downstream face. Pitch drain pans in two directions towards the outlet, with a slope of at least 1/8" per foot.

C. Provide factory installed thermostatic expansion valve.

2.10 REFRIGERATION PACKAGE

A. Compressor: Hermetically sealed, 3,600 rpm, resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, hard start kit, motor thermal overload protection, service valves, and drier.

B. Air Cooled Condenser: Aluminum fin and copper tube coil, direct drive propeller fan resiliently mounted, galvanized fan guard.

C. The use of chlorofluorocarbon (CFC)-based refrigerants is prohibited.

2.11 REFRIGERATION OPERATING CONTROLS

A. Low voltage, room thermostat controls compressor, condenser fan, and supply fan.

B. Include thermostat system selector switch (heat-cool-off) and fan control switch (on-auto).

C. Timer shall limit compressor starts to 12 per hour.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount air cooled condenser package on concrete pad (F-5) and on roof curb (F-1).

END OF SECTION 23 54 00

SECTION 23 72 00 - ENERGY RECOVERY DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fixed Plate Energy Exchange Element.

1.2 QUALITY ASSURANCE

A. Sound Ratings: Tested to AMCA 300.

B. Fabrication: Conform to AMCA 99 and AHRI 430.

C. Fixed Plate Energy Exchange Element: Effectiveness values shall be tested in accordance with ASHRAE 84, be AHRI certified to Standard 1060, and bear the AHRI Certification symbol for AHRI Air-to-Air Energy Recovery Ventilation Equipment Certification program based on AHRI 1060.

D. Unit shall bear a UL or ETL label of approval.

1.3 REFERENCES

A. ANSI/AHRI 1060 - 2011 - Rating Air-to-Air Energy Recovery Ventilation Equipment

B. ANSI/ASHRAE Standard 62.1 - 2010 - Ventilation for Acceptable Indoor Air Quality

C. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. ASHRAE 84 - Method of Testing Air-to-Air Heat Exchangers

E. NFPA 70 - National Electrical Code.

F. NFPA 90A - Installation of Air-Conditioning and Ventilation Systems.

G. UL 1812 - UL Standard for Safety for Ducted Heat Recovery Ventilators.

1.4 SUBMITTALS

A. Submit shop drawings per Section 23 05 00.

B. Energy transfer performance shall be clearly documented through a certification program conducted in accordance with ASHRAE 84 and AHRI 1060 standards. Submit fixed plate AHRI 1060 compliance certification with reference number.

C. Indicate ratings, flat plate performance, pressure drop, outdoor air correction factor (OACF), exhaust air transfer rate (EATR), motor electrical characteristics, gauges, material finishes, assembly, unit dimensions, weight, required clearances, construction details, and field connection details.

D. Submit manufacturer's installation instructions.

E. Any exceptions to the specifications must be clearly noted. Contractor is responsible for any additional expenses that may occur due to any exception made.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs.

B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.6 WARRANTY

A. Provide manufacturer's 10-year parts warranty on fixed plate energy exchange element against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 FIXED PLATE ENERGY EXCHANGE ELEMENT

A. Element shall be of cross-flow type and constructed of embossed aluminum with performance as scheduled on the drawings. Cross leakage shall be less than 1%.

B. Provide insulated, stainless steel drain pan under exchange element section. Pitch drain pan to connection on side of unit closest to floor drain. Drain pan shall conform to the latest edition of ASHRAE Standard 62, including addenda.

C. Unit shall be UL 1812 listed for ducted air-to-air heat exchangers.

D. Unit shall be capable of transferring sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust airstream and then to the fresh airstream.

E. Exhaust and fresh air streams shall, at all times, travel in separate passages, and air streams shall not mix.

F. Heat exchanger shall be equipped with face and bypass dampers to modulate effectiveness of the plate exchanger. Bypass area shall be sized for a static pressure more than the pressure drop through the face area. Face and bypass dampers shall be factory installed.

G. Airflow through the energy exchange element shall avoid deposition of particulates on the interior of the energy plate material.

H. Case shall be constructed of galvanized, 20-gauge steel, with lapped corners, and gasketed zinc plated screw fasteners.

I. Manufacturers:

1. CORE Energy Recovery Solutions
2. Innergytech
3. RenewAire
4. Heatex

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer's instructions.

B. Do not operate units for any purpose, temporary or permanent, until ductwork is clean and filters are in place.

C. P-traps must be installed for all drain pans.

END OF SECTION 23 72 00

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SECTION 23 74 11 - PACKAGED ENERGY RECOVERY UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Packaged Energy Recovery Units.

B. Unit Controls.

1.2 QUALITY ASSURANCE

A. All insulation inside the unit and in the airstream must comply with the requirement of NFPA 90A (maximum flame spread of 25 and maximum smoke developed of 50).

B. All units must be UL or ETL listed and must contain UL labeled components.

C. Fans shall be tested and rated in cabinet in accordance with AMCA Standard 210. All fan assemblies shall be dynamically balanced in cabinet at final assembly.

D. Conform to ASHRAE 90.1.

E. All air handling and distribution equipment mounted outdoors shall be designed to prevent rain intrusion into the airstream when tested at design airflow and with no airflow, using the rain test apparatus described in Section 58 of UL 1995.

1.3 REFERENCES

A. AHRI 270 - Sound Rating of Outdoor Unitary Equipment.

B. ASHRAE 37 - Methods of Testing for Rating Unitary Air Conditioning and Heat Pump Equipment.

C. ANSI/ASHRAE/IES Standard 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. NFPA 70 - National Electrical Code.

E. NFPA 90A - Installation of Air Conditioning and Ventilating System.

F. UL - Underwriters' Laboratory.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 23 05 00 .

B. Indicate electrical service and duct connections on shop drawings or product data.

C. Submit manufacturer's installation instructions.

D. Submit electrical power/controls wiring diagrams and product data indicating general assembly, components, safety controls, and service connections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect units from physical damage by storing off site until roof mounting frames are in place, ready for immediate installation of units.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, installation instructions, maintenance and repair data, and parts listing.

1.7 WARRANTY

A. Provide three (3) year manufacturer’s warranty for controls and electrical components.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Ruskin

B. Renewaire.

C. Oxygen8.

D. Trane.

E. York.

F. Daikin.

G. Carrier.

H. Bryant.

I. Lennox.

J. Ruud.

K. Greenheck.

L. Loren Cook.

2.2 MANUFACTURED UNITS

A. Provide indoor units having fans and energy recovery elements.

B. Unit shall be self-contained, packaged, factory assembled, pre-wired and tested, consisting of cabinet and frame, supply fan, exhaust fan, controls, air filters, and energy recovery elements.

C. Unit shall be furnished with non-fused disconnect switch, short fuse protection of all internal electrical components, and all necessary motor starters, contactors, and over-current protection.

2.3 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish, access doors or removable access panels with quick fasteners locking door handle type with piano hinges. Access doors shall be provided at each section (e.g., filter section, supply fan section, etc.). All exterior access panels must be permanently labeled on the outside indicating what is behind the panel. Structural members shall be minimum 18 gauge with access doors or removable panels of minimum 20 gauge.

B. Insulation: Minimum of 1/2” thick, 1.5 lb./cu. ft. density coated glass fiber insulation on surfaces where conditioned air is handled. Protect edges from erosion.

C. Air Filters: Two-inch thick glass fiber disposable media in metal frames.

2.4 FANS/MOTORS

A. Supply and Exhaust Fan: Forward curved centrifugal type, direct drive with EC Motors. Isolate complete fan assembly. All fan bearings must be capable of being lubricated by easily accessible grease fittings.

B. All fans must be statically and dynamically balanced.

C. Motors shall be open drip-proof with grease lubricated bearings.

D. No equipment shall be selected or operate above 90% of its motor nameplate rating.

E. Motor shall have 1.15 service factor.

2.5 ENERGY RECOVERY SECTION

A. Provide with fixed plate energy recovery section. Refer to 23 72 00 for additional information.

2.6 PERFORMANCE

A. Refer to schedules on construction drawings for unit capacity and performance.

2.7 ELECTRICAL

A. Provide with single point power connection, disconnect, and transformer. All units must be so constructed that when the electrical section access panel is opened, all electrical power to the unit is disconnected by means of a single disconnect.

B. All wiring must be labeled, numbered, and terminate in "spade clips". All terminal strips must be keyed to the wiring numbers. Each control device must be permanently labeled to indicate its function.

C. Wiring diagrams for all circuits must be permanently affixed to the inside of the electrical section access panel. The markings of terminal strips and wiring must agree with the numbering on the wiring diagrams.

D. All units shall include a transformer for controls and convenience outlet.

E. Only one power cable connection to the unit shall be necessary.

2.8 OPERATING CONTROLS - ENERGY RECOVERY UNITS

A. Provide with 7-day programmable thermostat.

B. Unit shall constantly operate during the occupied conditions, per the occupancy schedule provided by the owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All field wiring shall be in accordance with the National Electrical Code.

3.3 MANUFACTURER'S FIELD SERVICES

A. Provide initial start-up and shutdown during first year of operation, including routine servicing and check-out.

END OF SECTION 23 74 11

SECTION 23 82 16 - AIR COILS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric Coils.

1.2 REFERENCES

A. ANSI/AHRI 410 - Forced-Circulation Air Cooling and Air Heating Coils.

B. ANSI/NFPA 70 - National Electrical Code.

C. ANSI/UL 1096 - Electric Central Air Heating Equipment.

D. SMACNA - HVAC Duct Construction Standards, Metal and Flexible.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 23 05 00.

B. Submit shop drawings indicating coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

C. Submit manufacturer's installation instructions.

D. Submit manufacturer's data showing that coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.

E. Submit electrical power/controls wiring diagrams and product data indicating general assembly, components, safety controls, and service connections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.

B. Protect coils from entry of dirt and debris with pipe caps or plugs.

PART 2 - PRODUCTS

2.1 ELECTRIC COILS

A. Assembly: ANSI/UL 1096 listed and labeled, with terminal control box and hinged cover, splice box, coil, casing, and controls.

B. Coil: Exposed helical coil of nickel-chrome resistance wire with refractory ceramic support bushings.

C. Casing: Die formed channel frame of 18 gauge galvanized steel with 3/8-inch mounting holes on 6-inch centers. Provide tube supports for coils longer than 36-inches.

D. Controls: Automatic reset thermal cut-out, built-in magnetic contactors, control circuit transformer and fuse, manual reset thermal cut-out, airflow proving device, supplementary fusing for heaters over 48 amps, fused disconnect solid-state control with built-in zero-cross switching silicone controlled rectifier (SCR) and field installed thermostat.

E. Manufacturers:

1. Brasch
2. Indeeco
3. Chromalox

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements:

1. Install coils in accordance with manufacturer's instructions.
2. Protect coils to prevent damage to fins and flanges.
3. Make connections to coils with offsets and unions or flanges to allow coil to be removed without disturbing valves.
4. Comb all coils to repair bent fins.

B. Duct Mounted Coil:

1. Install in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible.
2. Insulate U-bends located outside ducts or casings as specified for ductwork.

END OF SECTION 23 82 16

SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. The intent of the drawings and specifications is to relocate four exterior parking lot lights. The equipment shall be furnished and installed as specified and shall include all incidental items necessary to provide complete working systems. Incidental items include but are not limited to conductors, conduits, signal cables, relays, fuses, fuse holders, connectors, splicers, breakers, ground rods, boxes, brackets, and hardware, etc., necessary to properly power the lighting equipment.

B. The work covered in this section includes verification, coordination, modification, and installation of new electrical lighting equipment.

C. The Contractor shall furnish and install all electrical equipment, control devices, feeders, breakers, conductors, conduits, and associated appurtenances necessary for a complete operable electrical lighting system. Conceptual electrical schematic diagrams and equipment layouts are shown on the drawings. The Contractor shall be responsible for the coordination of all electrical loads, circuits, configuration, orientation, and equipment layout.

D. The Contractor shall be fully responsible for communicating, coordinating, and scheduling work with the Owner and other contractors associated with a separate building improvements project occurring concurrently with this project.

E. The Contractor shall make a field visit and verify conditions such as voltages and electrical configurations to his own satisfaction.

F. The Contractor shall pay special attention to coordination with all trades during each construction phase such that work is performed in the proper sequence to mitigate construction conflicts and to prevent rework or damage to existing or proposed materials and equipment. Any additional costs associated with rework or damage shall be at the Contractor's expense.

G. Temporary power during construction shall be the Contractor's responsibility. The Contractor may use the existing electrical service during construction to startup and test of the lighting. Use of the existing electrical service shall be at no cost to the Contractor.

1.2 SUBMITTALS

A. Shop Drawings:

1. Concrete light pole bases.

B. Product Data:

1. Material Certifications:
   a. Concrete mix design for light pole bases and ductbanks.
   b. Concrete materials (aggregates, cement, fly ash, admixtures).
   c. Reinforcing steel and anchorage bolts.
   d. Non-shrink grout.
2. Catalog Information:
   a. Ground rods and clamps.
   b. Precast composite electrical handholes.
   c. Conduits, couplers, hangers, and expansion sleeves.
   d. Conduit spacing system.
   e. Conductors (insulated and bare).
   f. Cable splices and connectors.

g. Plastic electrical warning tape.

h. Firestop sealants, caulking, and joint sealants.

1.3 REFERENCE STANDARDS

A. Unless otherwise specified, materials and workmanship shall comply with the latest version of the following Standards:

1. Iowa Department of Transportation (DOT), Series 2023, GS-23002, April 16, 2024.
2. National Fire Protection Association (NFPA 70); National Electrical Code (NEC).
3. National Electrical Manufacturers Association (NEMA).
4. Institute of Electrical and Electronics Engineers (IEEE).
5. American Concrete Institute (ACI).
6. American National Standards Institute (ANSI).
7. American Society for Testing and Materials (ASTM).
8. American Iron and Steel Institute (AISI).
9. American Welding Society (AWS).
10. American Institute of Steel Construction (AISC).
11. American Association of State Highway and Transportation Officials (AASHTO).
12. Applicable federal, state, and local codes and regulations.
13. Underwriter's Laboratory (UL).
14. Insulated Cable Engineers Association, Inc. (ICEA).
15. International Building Code (IBC).
16. Occupational Safety and Health Act of 1970, as amended (OSHA).

B. In general, electrical and lighting materials shall be in accordance with Iowa DOT Sections 4151, 4152, 4153, and 4185; and construction standards shall be in accordance with Iowa DOT Sections 2403, 2404, and 2523, except as modified herein or as shown otherwise on the drawings.

1.4 REMOVAL AND SALVAGE

A. The Contractor shall remove, salvage, and reinstall existing light fixtures as shown on the drawings.

B. There are several existing buried utilities which shall remain operable during and after construction such as electrical feeders, telephone lines, water lines, storm drains, and sanitary sewers, etc. The Contractor shall protect all existing utilities and shall be responsible for repairs associated with damages during construction.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS

A. Secondary surge arrestors (aka Surge-Protection Devices - SPDs) shall be suitable for use in

service entrance locations, in accordance with NEC Article 285, ANSI/IEEE, and shall be UL Listed. Secondary surge arrestors shall be Class 6671 as manufactured by Square D Schneider Electric, or equivalent.

B. Conduit shall be as follows:

1. Materials for buried electrical conduit shall be PVC in accordance with Iowa DOT Section 4185.09, unless otherwise required to transition to existing conduits or equipment. All buried and underground PVC conduits in electrical feeder trenches shall be Schedule 40 PVC. Conduits exposed to the exterior environment (exterior above-ground applications) shall be PVC-coated GRC conduit.

2. Materials for electrical conduit located inside buildings that are entirely above the floor shall be electrical metallic tubing (EMT) conduit unless otherwise specified on the drawings or as required to maintain existing building fire ratings. EMT shall be in accordance with ANSI C80.3, zinc-coated steel with set-screw or compression fittings.

3. All conduits penetrating through concrete floors, foundations, pavements, or concrete pads shall be PVC-coated GRC rigid conduit; except conduits embedded in lighting pole foundations may be Schedule 40 PVC.

4. All brackets exposed to exterior environments shall be non-corrosive brackets constructed of aluminum or stainless steel. Hangers and brackets used for interior-mounted EMT conduits may be constructed of galvanized steel.

5. Conduit sealing bushings or an equivalent sealing method shall be installed to seal the end of exterior conduits as they penetrate panels, enclosures, etc.

6. Galvanized steel/PVC coated expansion joint fittings shall be two-piece design with lubricated seals as manufactured by Plasti-Bond REDH2OT, or equivalent.

C. Conduit spacing system shall be thermoplastic spacers designed to maintain uniform separation between conduits encased in concrete electrical ducts. Conduit spacing system shall Snap-N-Stac Spacers, as manufactured by Carlon®, or equivalent.

D. Connectors used in association with light poles and electrical handholes shall be submersible rated (UL 486D) for use with copper conductors and constructed in accordance with Iowa DOT Section 4185.10. Connectors shall be Series SLK as manufactured by Ideal Industries, Inc., or Series HEB as manufactured by Bussmann, or equivalent.

E. Lighting contactors shall be NEMA 1 enclosure, Class 8903, Type S, as manufactured by Square D, or equivalent.

F. Anchorage sizes, lengths, and orientation patterns for light poles shall match the existing light pole bases. Anchorages shall be designed to provide for breakaway capabilities, shall be cast-in-place during the construction of foundations, and shall be in accordance with the manufacturer's recommendations.

G. Concrete used for foundations shall be Class C structural concrete with Class 3 durability coarse aggregate in accordance with Iowa DOT Section 2403. Structural reinforcement shall be in accordance with Section 2404.

H. Underground-line warning tape shall be a permanent, red in color, continuous-printed, polyethylene tape with continuous, non-ferrous metallic strip or core. The tape shall be 6 inches wide by 3.5-mils thick.

I. Flexible firestop sealants shall be acrylic-based sealant designed to provide movement capability and maintain the fire ratings of wall penetrations. Firestop sealants shall be CP 606 as manufactured by Hilti, or equivalent.

2.2 CONDUCTORS AND CABLES

A. All conductors and insulation shall be copper in accordance with Iowa DOT Section 4185.11.

B. Backfill used around conduits and existing buried utilities shall be sand, Class II backfill materials conforming to Iowa DOT Section 2552.02 C. The sand shall be poorly graded with 100% of the materials passing the #4 sieve.

C. Conductor identification shall be imprinted plastic-coated cloth marking devices such as manufactured by Brady, Thomas & Betts, or equivalent; or shall be heat-shrink plastic.

2.3 GROUNDING

A. Ground rods shall be copper-clad steel ground rods; minimum ¾-inch diameter by 12-foot length for service or panel grounding; and minimum 5/8-inch diameter by 8-foot length for light poles.

B. Grounding shall be in accordance with Iowa DOT Section 2523.03 M and U; NEC Standards; as described in these specifications; and as shown on the drawings.

C. Grounding equipment, cables, conductors, and connections shall be as manufactured by AMPACT – Amp Special Industries, Burndy, CADWELD – Erico Products, Inc., ITT Blackburn, Harger, or equivalent.

2.4 ENCLOSURES

A. Electrical enclosures, switches, devices, and appurtenances shall be rated by NEMA. The lighting control enclosure shall be constructed of painted steel rated for the environment of installation and as shown on the drawings.

B. All electrical components shall conform to NEMA 250. All electrical devices shall receive nameplates engraved with black letters and white face laminated plastic and shall be securely fastened to all panels.

2.5 ELECTRICAL HANDHOLES

A. Buried electrical handholes shall be a precast concrete composite construction in accordance with Iowa DOT Section 4185.08 B; Type II, III, or IV as required for each application, in accordance with Figure LI-103, as modified herein, and as shown on the drawings.

B. Buried electrical handholes shall be sized to accommodate all conductor sizes, quantities, and space for conductor loops. Buried electrical handholes shall be equipped with an open-bottom and heavy-duty skid-resistant cover with and secured in place with stainless steel hex head bolts. Buried electrical handholes shall be as manufactured by Quazite or equivalent. The Owner shall select handhole colors from the manufacturer's standard color samples during the submittal process.

C. Handholes shall have load ratings for exposure to vehicular traffic in accordance with the latest version of ANSI/SCTE 77 "Specifications for Underground Enclosure Integrity," in accordance with the location of each handhole. At a minimum, all handholes shall have a vertical design load rating of 20,000 lbs. and shall be Tier 22 rated for applications subject to occasional, non-deliberate heavy vehicle traffic.

2.6 FOUNDATIONS

A. Materials of light pole bases/foundations shall be in accordance with Iowa DOT Sections 2403 and 2404, the manufacturer's recommendations, and as shown on the drawings.

B. Lighting pole foundations shall be cast-in-place with reinforcement in accordance with Iowa

DOT Section 4151.

C. The Contractor shall furnish and install, at no additional cost to the Owner, slip bases which are required to correct any pole orientation deficiencies. Slip bases shall be in accordance with Iowa DOT Figure LI-211.

D. Paint for light pole bases shall be yellow in color and may be either waterborne or solvent-based, meeting the requirements of Iowa DOT Section 4183 for fast-dry paint.

2.7 LIGHTING POLES

A. Existing light poles shall be removed, salvaged, and reinstalled as shown on the drawing.

PART 3 EXECUTION

3.1 GENERAL CONSTRUCTION

A. Ground fault circuit interrupters (GFCI) shall be tested with local and remote fault simulations in accordance with the manufacturer's recommendations.

B. Conduit installation shall be in accordance with the drawings and as follows:

1. All interior conduits shall be securely fastened in a neat and pleasing fashion with non-corrosive brackets and hardware. Conduits shall be installed as required to maintain the building wall fire rating, firestop sealants, and/or other materials shall be utilized for this purpose.

2. In an effort to reduce condensation and corrosion potential in electrical panels and boxes, all buried conduit terminations shall be sealed to prevent condensation or corrosive gases from following conduits into panels, junction boxes, and equipment. Conduit sealing bushings or an equivalent sealing method designed for this purpose may be installed to seal the end of conduits as they penetrate control panels, enclosures, etc.

3. Conduits shall be constructed with large radii such that replacement of conductors may be easily performed. All electrical junction boxes or enclosures shall be sized in accordance with NEC requirements.

4. All buried conduits that connect to rigidly mounted exterior equipment, wall penetrations, or enclosures above ground shall be installed with appropriately sized exterior-rated PVC-coated GRC rigid metal conduit expansion sleeves located above the ground to provide for expansion/contraction due to temperature changes or freeze/thaw.

5. Electrical splices or junctions of conductors shall not be allowed inside conduits (i.e. new cables shall be continuous, without splices). Electrical splices or connections shall not be allowed in buried electrical feeders, except in junction boxes or hand holes, and then only with submersible-rated connectors.

C. Connectors used in association with light poles and electrical handholes shall be installed with an oxidation inhibitor.

D. Ground rods shall be located as shown on the drawings. The top of each ground rod shall be at least 12 inches below the finished grade and in direct contact with undisturbed soil.

E. Anchorages shall be cast-in-place during the construction of foundations and shall be in accordance with the manufacturer's recommendations. The Contractor shall take care to orient the anchorage pattern required for each light pole such that each light pole shall be oriented to cause the luminaire arm to be perpendicular to the curb, edge of pavement, or edge of granular surfacing; except where shown otherwise on the drawings. Bolts and nuts associated with anchorages shall be installed utilizing an anti-seize compound, applied directly to the threads

prior to installation to reduce galling of the threads and locking caused by rust. Excess compound shall be removed and surfaces cleaned. Care shall be taken to prevent application of any thread compound to any surfaces receiving paint.

F. The Contractor shall coordinate the installation of grounding conductors bonded to foundation rebar by exothermic weld prior to the installation of concrete.

G. Surfaces of any aluminum materials which are in direct contact with concrete shall receive a bituminous coating prior to installation.

H. Lighting materials and equipment shall be constructed and installed in accordance with Iowa DOT Section 2523, except as shown otherwise in these specifications or on the drawings.

3.2 CONDUCTORS AND CABLES

A. All conductors shall be copper in accordance with Section 26 00 00(2.2) and as shown on the drawings.

B. Care shall be given during the installation of conductors to prevent damage to the conductor or the insulation. Splices shall not be permitted within conduits.

C. Trenching, dewatering, and backfilling shall be in accordance with Iowa DOT Section 2523.03; except electrical trenches shall be compacted with a hand-operated or walk-behind vibratory plate compactor in maximum 12-inch lifts (loose materials) and with a minimum compaction of 90% Standard Proctor Density or greater in accordance with pavement subbase compaction requirements when buried under pavement. Backfill around conduits and around existing buried utilities shall be sand, as described in Section 26 00 00(2.2).

D. Conductors shall be marked by circuit identification at each light pole, handhole, junction box, control devices, and light panel.

E. Care shall be taken to prevent moisture (condensation or rain) from entering the open ends of all insulated conductors during construction, which may encourage conductor oxidation. Temporary cable covering caps or an equivalent secure method for moisture protection shall be utilized for this purpose.

F. Conductors shall be tested in accordance with Section 26 00 00 (3.8) Testing and Training.

3.3 GROUNDING

A. Grounding shall be in accordance with Iowa DOT Sections 2523.03 M and U and 4185.04; NEC Standards; as described in these specifications; and as shown on the drawings.

B. The grounding/bonding system shall be established utilizing bare copper grounding as shown on the drawings. Lighting grounding/bonding shall be properly connected to the electrical service grounding system. Grounding conductors shall be installed no closer than 24 inches to the foundation walls or slabs and shall be buried at least 24 inches in depth and in contact with soil (not granular materials).

C. Ground rods shall terminate at least 12 inches below the surface of the soil.

D. Lighting poles shall be bonded to the ground ring via appropriately sized copper conductors. Each light pole shall have one 5/8" x 8' ground rod as shown on the drawings. An insulated equipment grounding conductor shall be installed with all branch circuits or wiring harnesses inside light poles. Wireways, metal enclosures, and similar components of the electrical system shall be solidly grounded. Metallic conduits, supports, cabinets, and non-current carrying parts of equipment shall be solidly grounded to form a continuous permanent and effective ground.

E. Connections of grounding conductors to embedded foundation reinforcement shall be via exothermic welds. Connections between other grounding conductors may be either via exothermic welds or by copper compression connectors designed for direct buried use. Connections of grounding conductors with ground rods shall be made with copper clad or bronze ground rod clamps. The grounding system shall be reviewed by the Civil Engineer prior to backfilling with soil. Exothermic weld connections shall be reviewed by the Civil Engineer during the construction of foundations and prior to concrete pours.

F. See Section 26 00 00(3.8) Testing and Training for coordination of testing required during installation.

G. Grounding equipment, cables, conductors, and connections shall be as manufactured by AMPACT – Amp Special Industries, Burndy, CADWELD – Erico Products, Inc., ITT Blackburn, Harger, or equivalent.

3.4 ENCLOSURES

A. Electrical enclosures, switches, devices, and appurtenances shall be rated by NEMA. The lighting control enclosure shall be constructed of painted steel and NEMA-rated according to the installed location.

B. All electrical components shall conform to NEMA 250. All electrical devices shall receive nameplates which shall be black letter, white face laminated plastic engraved, and shall be securely fastened with stainless steel screws to all panels and disconnects.

C. The Contractor shall furnish and install the lighting control devices and associated appurtenances as shown on the drawings. A conceptual layout is shown on the drawings. The Contractor shall be responsible for the coordination of all electrical loads, circuits, and layouts.

3.5 ELECTRICAL HANDHOLES

A. The Contractor shall furnish and install buried electrical handholes as required for convenient construction and maintenance of the lighting system. The general locations of handholes are shown on the drawings. The Contractor shall communicate with the Owner and Civil Engineer for review if the proposed handhole locations.

B. Buried electrical handholes shall be sized to accommodate all conductor sizes, quantities, and space for conductor loops. The Owner shall select handhole colors from the manufacturer's standard color samples during the submittal process.

C. Buried electrical handholes shall be installed on a granular base in accordance with Iowa DOT Section 4189.01 and as shown on the drawings.

D. The top of buried electrical handholes shall be installed flush with the proposed finished grade surface which may itself be sloped; thereby in some applications, the top of the handhole may not be level.

E. Backfill of buried electrical handholes shall be compacted by handheld compaction devices.

3.6 FOUNDATIONS

A. The Contractor shall furnish and install lighting pole bases/foundations. Construction of foundations shall be in accordance with Iowa DOT Sections 2403 and 2404, manufacturer's recommendations, and as shown on the drawings.

B. The Contractor shall stake the centerline and top elevation of each light pole foundation. The exact location and elevation of handholes shall be determined in the field by the Contractor with review by the Owner and Civil Engineer. Electrical handholes shall be located to provide reasonable protection from potential traffic and storm water inundation.

C. Lighting pole foundations shall be cast-in-place, with minimum foundation dimensions and structural reinforcement, as shown on the drawings. The Contractor shall utilize factory-supplied anchorage templates for the installation of all anchorage bolts. The Contractor shall be solely responsible to coordinate pole orientation to properly position each light pole with each luminaire mast arm perpendicular to the curb, edge of pavement, or edge of granular surfacing. Poles shall be constructed in accordance with Figure LI-101 (where applicable) and oriented such that the luminaire is directed as shown on the drawings. Embedded anchorage shall be designed to provide for pole breakaway capabilities.

D. The Contractor shall coordinate the installation of the grounding conductors and exothermically weld them to structural reinforcement prior to concrete pours. The Contractor shall coordinate the position of all anchorages, the required quantity, sizes, positions, and the orientation of all conduits for each foundation. The Contractor shall furnish and install (at no additional cost to the Owner) slip bases which are required to correct all pole orientation deficiencies. Slip bases shall be in accordance with Iowa DOT Figure LI-211.

E. Care shall be given to coordinate the location of each conduit cast in the foundations required to correspond with the space available inside each light pole base plate.

F. After the foundation and poles have been installed, the above-ground portion of the concrete base shall be painted yellow. The paint shall meet the requirements of Section 26 00 00 (2.6). Reflective glass spheres are not required. The paint shall be applied as described in Iowa DOT Section 2527. The light pole and surrounding ground shall be sufficiently masked to prevent overspray or drips. The finished surface shall be uniformly covered with paint and free from drips and runs on the vertical face of the base.

3.7 LIGHTING POLES

A. The Contractor shall be fully responsible for the coordination of all dimensions and compatibility between the light poles, luminaire mast arms, anchorages, foundations, and luminaire installations.

3.8 TESTING AND TRAINING

A. The Contractor shall be responsible for all field tests in accordance with Iowa DOT Section 2523.03 U and as described in this section. The Contractor shall provide test equipment, labor, and other costs associated with testing. Equipment damaged from testing, or materials and equipment that require replacement as a result of testing, shall be the responsibility of the Contractor. Field test reports shall be submitted to the Engineer prior to project acceptance.

B. The Contractor shall secure a certified State of Iowa electrical inspection and shall coordinate the scheduling of site inspections as directed by the state electrical inspector. All communications shall be copied as they occur with the Owner and Civil Engineer.

C. All insulated conductors shall be megger tested in accordance with NETA prior to final connection with luminaires. Cable megger values shall be at least 100 mega ohms. Repairs and/or replacement of conductors shall be performed until successful testing is accomplished. No repairs or splices shall be made to insulated conductors within conduits; only submersible-rated repairs or splices within enclosures, handholes, and junction boxes will be acceptable.

D. The grounding system shall be tested during installation.

E. The Contractor shall perform operational testing of lighting control devices and luminaires as necessary to verify their operational functionality. Testing shall be performed in the presence of the Owner and Civil Engineer.

END OF SECTION

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 26 Sections. Also refer to Division 1 - General Requirements. This section is also applicable to Fire Alarm and Detection Systems Section 28 31 00.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.3 SCOPE OF WORK

A. This Specification and the associated drawings govern furnishing, installing, testing and placing into satisfactory operation the Electrical Systems.

B. The Contractor shall furnish and install all new materials as indicated on the drawings, and/or in these specifications, and all items required to make the portion of the Electrical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.

D. Description of Systems shall be as follows:

1. Electrical power system to and including luminaires, equipment, motors, devices, etc.
2. Electrical power service system from the Utility Company to and including service entrance equipment, distribution and metering.
3. Grounding system.
4. Fire alarm system.
5. Wiring system for temperature control system as shown on the drawings.
6. Removal work and/or relocation and reuse of existing systems and equipment.

E. Work Not Included:

1. Temperature control wiring for plumbing and HVAC equipment (unless otherwise indicated) will be by other Contractors.

1.4 WORK SEQUENCE

A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours are required.

B. Itemize all work and list associated hours and pay scale for each item.

1.5 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL, and CONTROL CONTRACTORS

A. Division of work is the responsibility of the Prime Contractor. Any scope of work described at any location on the contract document shall be sufficient for including said requirement in the project. The Prime Contractor shall be solely responsible for determining the appropriate subcontractor for the described scope. In no case shall the project be assessed an additional cost for scope that is described on the contract documents on bid day. The following division of responsibility is a guideline based on typical industry practice.

B. Definitions:

1. "Mechanical Contractors" refers to the Contractors listed in Division 21/22/23 of this Specification.
2. Motor Power Wiring: The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
3. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case, the devices are usually single phase, have "Manual-Off-Auto" provisions, and are usually connected into the motor power wiring through a manual motor starter.
4. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
5. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. When the motor power wiring exceeds 120 volts, a control transformer is usually used to give a control voltage of 120 volts.
6. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring that directly powers or controls a motor used to drive equipment such as fans, pumps, etc. This wiring will be from a 120-volt source and may continue as 120 volt, or be reduced in voltage (24 volt), in which case a control transformer shall be furnished as part of the temperature control wiring.
7. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
8. Low Voltage Technology Wiring: The wiring associated with the technology systems, used for analog or digital signals between equipment.
9. Telecommunications/Technology Rough-in: Relates specifically to the backboxes, necessary plaster rings and other miscellaneous hardware required for the installation or mounting of telecommunications/technology information outlets.

C. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractors' responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors, etc. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals approved. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.

2. Where the drawings require the Electrical Contractor to wire between equipment furnished by the Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. The Mechanical Contractor shall furnish complete wiring diagrams and supervision to the Electrical Contractor and designate the terminal numbers for correct wiring.
3. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.
4. The Electrical Contractor shall establish electrical utility elevations prior to fabrication and installation. The Electrical Contractor shall coordinate utility elevations with other trades. When a conflict arises, priority shall be as follows:

    a. Luminaires.
    b. Gravity flow piping, including steam and condensate.
    c. Sheet metal.
    d. Cable trays, including access space.
    e. Other piping.
    f. Conduits and wireway.

D. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment furnished by the Mechanical Contractor.
2. Assumes all responsibility for miscellaneous items furnished by the Mechanical Contractor that require wiring but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the mechanical system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor.
3. Assumes all responsibility for Temperature Control wiring, if the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

E. Temperature Control Contractor's or Subcontractor's Responsibility:

1. Wiring of all devices needed to make the Temperature Control System functional.
2. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not shown on the electrical drawings, is the responsibility of the Temperature Control Contractor or Subcontractor.
3. Coordinating equipment locations (such as PE's, EP's, relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.

F. Electrical Contractor's Responsibility:

1. Furnishes and installs all combination starters, manual starters and disconnect devices shown on the Electrical Drawings or indicated to be by the Electrical Contractor in the Mechanical Drawings or Specifications.
2. Installs and wires all remote-control devices furnished by the Mechanical Contractor or Temperature Control Contractor when so noted on the Electrical Drawings.
3. Furnishes and installs motor control and temperature control wiring, when noted on the drawings.
4. Furnishes, installs, and connects all relays, etc., for automatic shutdown of certain mechanical equipment (supply fans, exhaust fans, etc.) upon actuation of the Fire Alarm System.

5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

1.6 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guides, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Architect/Engineer any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Architect/Engineer will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers as determined by the Architect/Engineer are acceptable.
2. All Contractors and subcontractors shall employ only workmen who are skilled in their trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site.

C. Compliance with Codes, Laws, Ordinances:

1. Conform to all requirements of the City of Ottumwa, Iowa Codes, Laws, Ordinances and other regulations having jurisdiction.
2. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
3. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
4. All changes to the system made after the letting of the contract to comply with codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
5. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
6. If there are no local codes having jurisdiction, the current issue of the National Electrical Code shall be followed.

D. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.

2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.
4. Pay all fees and taxes imposed by State, Municipal, and other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.
6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
7. Where applicable, all fixtures, equipment and materials shall be listed by Underwriter's Laboratories, Inc. or a nationally recognized testing organization.

E. Utility Company Requirements:

1. Secure from the private or public utility company all applicable requirements.
2. Comply with all utility company requirements.
3. The Owner shall make application for and pay for new electrical service equipment and installation. The Contractor shall coordinate schedule and requirements with the Owner and Utility Company.
4. The contractor is responsible for completing utility requested forms and sharing utility requested load data from the construction documents.
5. Furnish the meter socket. Verify approved manufacturers and equipment with the Utility Company.
6. The Owner shall apply and pay for any changes for removal of existing electrical service by the utility company. The Contractor shall verify approved manufacturers and equipment with the Utility Company.

F. Examination of Drawings:

1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of raceways to best fit the layout of the job. Conduit entry points for electrical equipment including, but not limited to, panelboards, switchboards, switchgear and unit substations, shall be determined by the Contractor unless noted in the contract documents.
3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either shown on the drawings or called for in the specifications, it shall be included in this contract.
7. The Contractor shall determine quantities and quality of material and equipment required from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater and better-quality number shall govern.
8. Where used in electrical documents the word "furnish" shall mean supply for use, the word "install" shall mean connect up complete and ready for operation, and the word "provide" shall mean to supply for use and connect up complete and ready for operation.
9. Any item listed as furnished shall also be installed unless otherwise noted.
10. Any item listed as installed shall also be furnished unless otherwise noted.

G. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.

2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

H. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any conduit, conductors, wireways, bus duct, fittings, etc.

1.7 WEB-BASED PROJECT SOFTWARE

A. The General Contractor shall provide a web-based project software site for the purpose of hosting and managing project communication and documentation until completion of the warranty phase.

B. The web-based project software shall include, at a minimum, the following features: construction schedule, submittals, RFIs, ASIs, construction change directives, change orders, drawing management, specification management, payment applications, contract modifications, meeting minutes, construction progress photos.

C. Provide web-based project software user licenses for use by the Architect/Engineer. Access will be provided from the start of the project through the completion of the warranty phase.

D. At project completion, provide digital archive of entire project in format that is readable by common desktop software applications in format acceptable to Architect/Engineer. Provide data in locked format to prevent further changes.

1.8 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

Referenced Specification Section	Submittal Item
26 09 33	Lighting Control System

Referenced Specification Section	Submittal Item
26 24 16	Panelboards
26 27 26	Wiring Devices
26 28 16	Disconnect Switches
26 24 19	Motor Control
26 51 19	LED Lighting

B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:

   a. Date
   b. Project title and number
   c. Contractor's name and address
   d. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
   e. Description of items submitted and relevant specification number
   f. Notations of deviations from the contract documents
   g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

   a. Date
   b. Project title and number
   c. Architect/Engineer
   d. Contractor and subcontractors' names and addresses
   e. Supplier and manufacturer's names and addresses
   f. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
   g. Description of item submitted (using project nomenclature) and relevant specification number
   h. Notations of deviations from the contract documents
   i. Other pertinent data
   j. Provide space for Contractor's review stamps

3. Composition:

   a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
   b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
   c. All sets shall contain an index of the items enclosed with a general topic description on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

5. Contractor's Approval Stamp:

    a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
    b. Unstamped submittals will be rejected.
    c. The Contractor's review shall include, but not be limited to, verification of the following:

        1) Only approved manufacturers are used.
        2) Addenda items have been incorporated.
        3) Catalog numbers and options match those specified.
        4) Performance data matches that specified.
        5) Electrical characteristics and loads match those specified.
        6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
        7) Dimensions and service clearances are suitable for the intended location.
        8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
        9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).

    d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
    e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:

    a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
    b. The Contractor shall clearly indicate the size, finish, material, etc.
    c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
    d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.

15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

    a. Allow at least two weeks for Architect's/Engineer's review and processing of each submittal, excluding mailing.

16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. Submittal file name: 26 XX XX.description.YYYYMMDD
    b. Transmittal file name: 26 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.9 SCHEDULE OF VALUES

A. The requirements herein are in addition to the provisions of Division 1.

B. Format:

1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
2. Submit in Excel format.
3. Support values given with substantiating data.

C. Preparation:

1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
2. Break down all costs into:

    a. Material: Delivered cost of product with taxes paid.
    b. Labor: Labor cost, excluding overhead and profit.

D. Update Schedule of Values when:

1. Indicated by Architect/Engineer.
2. Change of subcontractor or supplier occurs.
3. Change of product or equipment occurs.

1.10 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.

B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.

C. Change order work shall not proceed until authorized.

1.11 PRODUCT DELIVERY, STORAGE, HANDLING and MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Distribution equipment - branch panels, distribution panels, switchboards, motor control centers, etc.
2. Variable frequency drives.
3. Transformers, ventilated.
4. Electronic equipment.
5. Lighting luminaires and lighting control systems.

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all materials clean, dry and free from damaging environments.

E. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.12 WARRANTY

A. Provide one-year warranty for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this specification Division shall commence on the date of Substantial Completion or successful system performance whichever occurs later. The warranty may also commence if a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization of the Owner. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements extend to correction, without cost to the Owner, of all work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage due to defects or nonconformance with contract documents excluding repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

1.13 INSURANCE

A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.14 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the manufacturer for which a catalog number is given is the basis for job design and establishes the quality.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors. The Architect/Engineer shall make the final determination of whether a product is equivalent.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer via addendum. The Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on the Contractors part or on the part of other Contractors whose work is affected.

D. Voluntary add or deduct prices for alternate materials may be listed on the bid form. These items will not be used in determining the low bidder. This Contractor assumes all costs incurred as a result of using the offered material or equipment on the Contractors part or on the part of other Contractors whose work is affected.

E. All material substitutions requested after the final addendum must be listed as voluntary changes on the bid form.

PART 2 - PRODUCTS

2.1 GENERAL

A. All items of material having a similar function (e.g., safety switches, panelboards, switchboards, contactors, motor starters, dry type transformers) shall be of the same manufacturer unless specifically stated otherwise on drawings or elsewhere in specifications.

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 EXCAVATION, FILL, BACKFILL, COMPACTION

A. General:

1. Prior to the commencement of any excavation or digging, the Contractor shall verify all underground utilities with the regional utility locator. Provide prior notice to the locator before excavations. Contact information for most regional utility locaters can be found by calling 811.
2. The Contractor shall do all excavating, filling, backfilling, compacting, and restoration in connection with the work.

B. Excavation:

1. Make all excavations to accurate, solid, undisturbed earth, and to proper dimensions.
2. If excavations are carried in error below indicated levels, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer shall be placed in such excess excavations under the foundation. Place thoroughly compacted, clean, stable fill in excess excavations under slabs on grade, at the Contractor's expense.
3. Trim bottom and sides of excavations to grades required for foundations.
4. Protect excavations against frost and freezing.
5. Take care in excavating not to damage surrounding structures, equipment or buried pipe. Do not undermine footing or foundation.
6. Perform all trenching in a manner to prevent cave-ins and risk to workmen.
7. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.

8. If satisfactory bearing soil is not found at the indicated levels, immediately notify the Architect/Engineer or their representative, and do no further work until the Architect/Engineer or their representative gives further instructions.
9. Excavation shall be performed in all ground conditions, including rock, if encountered. Bidders shall visit the premises and determine the soil conditions by actual observations, borings, or other means. The cost of all such inspections, borings, etc., shall be borne by the bidder.
10. If a trench is excavated in rock, a compacted bed with a depth of 3" (minimum) of sand and gravel shall be used to support the conduit unless masonry cradles or encasements are used.
11. Mechanical excavation of the trench to line and grade of the conduit or to the bottom level of masonry cradles or encasements is permitted, unless otherwise indicated on the electrical drawings.
12. Mechanical excavation of the trench to line and grade where direct burial cables are to be installed is permitted provided the excavation is made to a depth to permit installation of the cable on a fine sand bed at least 3 inches deep.

C. Dewatering:

1. Furnish, install, operate and remove all dewatering pumps and pipes needed to keep trenches and pits free of water.

D. Underground Obstructions:

1. Known underground piping, conduit, feeders, foundations, and other obstructions in the vicinity of construction are shown on the drawings. Review all Bid Documents for all trades on the project to determine obstructions indicated. Take great care in making installations near underground obstructions.
2. If objects not shown on the drawings are encountered, remove, relocate, or perform extra work as directed by the Architect/Engineer.

E. Fill and Backfilling:

1. No rubbish or waste material is permitted for fill or backfill.
2. Provide all necessary sand and/or CA6 for backfilling.
3. Native soil materials may be used as backfill if approved by the Geotechnical Engineer.
4. Dispose of the excess excavated earth as directed.
5. Backfill materials (native soil material, sand, and/or CA6) shall be suitable for required compaction, clean and free of perishable materials, frozen earth, debris, earth with a high void content, and stones greater than 4 inches in diameter. Water is not permitted to rise in unbackfilled trenches.
6. Backfill all trenches and excavations immediately after installing of conduit, or removing forms, unless other protection is directed.
7. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Spread fill and backfill materials in 6" uniform horizontal layers with each layer compacted separately to required density.
8. For conduits that are not concrete encased, lay all conduits on a compacted bed of sand at least 3" deep. Backfill around conduits with sand, in 6" layers and compact each layer.
9. Backfill with native soil material (if approved) or sand up to grade for all conduits under slabs or paved areas. All other conduits shall have sand backfill to 6" above the top of the conduit.
10. Place all backfill above the sand in uniform layers not exceeding 6" deep. Place then carefully and uniformly tamp each layer to eliminate lateral or vertical displacement.

11. Where the fill and backfill will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density as determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content as determined by AASHTO T-99 or ASTM D-698 test.
12. After backfilling of trenches, no superficial loads shall be placed on the exposed surface of the backfill until a period of 48 hours has elapsed.

F. Surface Restoration:

1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition. Replace all planting and landscaping features removed or damaged to its original condition. At least 6" of topsoil shall be applied where disturbed areas are to be seeded or sodded. All lawn areas shall be sodded unless seeding is called out in the drawings or specifications.
2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged shall be replaced with comparable materials and restored to original condition. Broken edges shall be saw cut and repaired as directed by Architect/Engineer.

3.3 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Covering exterior walls, interior partitions and chases.
2. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will review the installation and provide a written report noting deficiencies requiring correction. The contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

3.4 PROJECT CLOSEOUT

A. The following paragraphs supplement the requirements of Division 1.

B. Final Jobsite Observation:

1. To prevent the Final Jobsite Observation from occurring too early, the Contractor shall review the completion status of the project and certify that the job is ready for the final jobsite observation.
2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review. The Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
3. It is understood that if the Architect/Engineer finds the job not ready for the final observation and additional trips and observations are required to bring the project to completion, the cost of the additional time and expenses incurred by the Architect/Engineer will be deducted from the Contractor's final payment.
4. Contractor shall notify Architect/Engineer 48 hours prior to installation of ceilings or lay-in ceiling tiles.

C. The following must be submitted before Architect/Engineer recommends final payment:

1. Operation and maintenance manuals with copies of approved shop drawings.
2. Record documents including marked-up or reproducible drawings and specifications.

3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of this Contractor and shall be signed by the Owner's representatives.
4. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and submit receipt to Architect/Engineer.
5. Inspection and testing report by the fire alarm system manufacturer.

3.5 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. O&M file name: O&M.div26.contractor.YYYYMMDD
    b. Transmittal file name: O&Mtransmittal.div26.contractor.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.

3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copies of all factory inspections and/or equipment startup reports.
5. Copies of warranties.
6. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
7. Dimensional drawings of equipment.
8. Detailed parts lists with lists of suppliers.
9. Operating procedures for each system.
10. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
11. Repair procedures for major components.
12. Replacement parts and service material requirements for each system and the frequency of service required.
13. Instruction books, cards, and manuals furnished with the equipment.
14. Include record drawings of the one-line diagrams for each major system. The graphic for each piece of equipment shown on the one-line diagram shall be an active link to its associated Operation & Maintenance data.
15. Copies of all panel schedules in electronic Microsoft Excel spreadsheet (.xlsx) file. Each panelboard shall be a separate tab in the workbook.

3.6 INSTRUCTING THE OWNER'S REPRESENTATIVE

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of the complete systems installed under this contract.

B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

C. The instructions shall include:

1. Maintenance of equipment.
2. Start-up procedures for all major equipment.
3. Description of emergency system operation.

D. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can be present if desired.

E. Minimum hours of instruction time for each item and/or system shall be as indicated in each individual specification section.

F. Operating Instructions:

1. Contractor is responsible for all instructions to the Owner's representatives for the electrical and specialized systems.
2. If the Contractor does not have staff that can adequately provide the required instructions, the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.7 RECORD DOCUMENTS

A. The following paragraphs supplement Division 1 requirements.

B. Maintain at the job site a separate and complete set of electrical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings and specifications to indicate approved substitutions; Change Orders, and actual equipment and materials used. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should this Contractor fail to complete Record Documents as required by this contract, this Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at the time of work.

D. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

E. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

F. Record actual routing of conduits exceeding 2 inches.

3.8 PAINTING

A. Paint all equipment that is marred or damaged prior to the Owner's acceptance. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier if available. All equipment shall have a finished coat of paint applied unless specifically allowed to be provided with a prime coat only.

B. Equipment in finished areas that will be painted to match the room decor will be painted by others. Should this Contractor install equipment in a finished area after the area has been painted, the Contractor shall have the equipment and all its supports, hangers, etc., painted to match the room decor. Painting shall be performed as described in project specifications.

C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment rooms or concealed spaces, shall be furnished in standard finish, free from scratches, abrasions, chippings, etc.

D. Equipment in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chipping, etc. If color option is specified or is standard to the unit, verify with the Architect the color preference before ordering.

3.9 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.

B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.

C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.10 SPECIAL REQUIREMENTS

A. Coordinate the installation of all equipment, controls, devices, etc., with other trades to maintain clear access area for servicing.

B. Install all equipment to maximize access to parts needing service or maintenance. Review the final location, placement, and orientation of equipment with the Owner's representative prior to setting equipment.

C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's representative will result in removal and reinstallation of the equipment at the Contractor's expense.

3.11 INDOOR AIR QUALITY (IAQ) MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

A. Within the Limits of Construction:

1. The Electrical Contractor shall coordinate all work with the contractor responsible for IAQ.
2. The means, methods and materials used by the Electrical Contractor shall be coordinated with the contractor responsible for IAQ and shall comply with the IAQ requirements set forth in Division 1 and Division 21/22/23 of these specifications.

B. Outside the Limits of Construction:

1. IAQ shall be the responsibility of the electrical contractor for work that is required outside the limits of construction.
2. The Electrical Contractor is responsible for the IAQ set forth in Division 1 and Division 21/22/23 of these specifications.
3. The Electrical Contractor shall review and coordinate all IAQ plans and procedures with the owner's IAQ representative.

3.12 FIELD QUALITY CONTROL

A. General:

1. Conduct all tests required during and after construction. Submit test results in NETA format, or equivalent form, that shows the test equipment used, calibration date, tester's name, ambient test conditions, humidity, conductor length, and results corrected to 40°C.
2. Supply necessary instruments, meters, etc., for the tests. Supply competent technicians with training in the proper testing techniques.
3. All cables and wires shall be tested for shorts and grounds following installation and connection to devices. Replace shorted or grounded wires and cables.
4. Any wiring device, electrical apparatus or luminaire, if grounded or shorted on any integral "live" part, shall have all defective parts or materials replaced.
5. Test cable insulation of service and panel feeder conductors for proper insulation values. Tests shall include the cable, all splices, and all terminations. Each conductor shall be tested and shall test free of short circuits and grounds and have an insulation value not less than Electrical Code Standards. Take readings between conductors, and between conductors and ground.
6. If the results obtained in the tests are not satisfactory, make adjustments, replacements, and changes as needed. Then repeat the tests, and make additional tests, as the Architect/Engineer or authority having jurisdiction deems necessary.

B. Ground-Fault Equipment Performance Testing:

1. Test: Perform ground-fault performance testing when system is installed. The test process shall use primary current injection per manufacturer instruction and procedures. Perform test for the following:

   a. Service disconnects
   b. Outside branch circuits and feeders.
   c. Code required.

2. Report: Provide copy of test result report with Operation and Maintenance manuals. Provide report to Authority Having Jurisdiction when requested.

C. Other Equipment:

1. Give other equipment furnished and installed by the Contractor all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, voltage complies with equipment nameplate rating, and full load amperes are within equipment rating.

D. If any test results are not satisfactory, make adjustments, replacements and changes as needed and repeat the tests and make additional tests as the Architect/Engineer or authority having jurisdiction deem necessary.

E. Report shall include color printouts, in binder, of pictures taken to use as a baseline reading after building is occupied.

F. Upon completion of the project, the Contractor shall provide amperage readings for all panelboards and switchboards and turn the results over to the Owner for "benchmark" amperages.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Penetrations of fire-rated construction fire sealed in accordance with specifications.
2. Electrical panels have typed circuit identification.
3. Per Section 26 05 00, cable insulation test results have been submitted.
4. Operation and Maintenance manuals have been submitted as per Section 26 05 00.
5. Bound copies of approved shop drawings have been submitted as per Section 26 05 00.
6. Report of instruction of Owner's representative has been submitted as per Section 26 05 00.
7. Fire alarm inspection and testing report has been submitted as per Sections 26 05 00 and 28 31 00.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

END OF SECTION 26 05 00

SECTION 26 05 05 - ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work shall be as specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. THE DRAWINGS ARE INTENDED TO INDICATE THE SCOPE OF WORK REQUIRED AND DO NOT INDICATE EVERY BOX, CONDUIT, OR WIRE THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.

B. Where walls, ceilings, structures, etc., are indicated as being removed on general or electrical drawings, the Contractor shall be responsible for the removal of all electrical equipment, devices, fixtures, raceways, wiring, systems, etc., from the removed area.

C. Where ceilings, walls, structures, etc., are temporarily removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.

D. Where mechanical or technology equipment is indicated as being removed on electrical, mechanical, or technology drawings, the Contractor shall be responsible for disconnecting the equipment and removing all starters, VFD, controllers, electrical equipment, raceways, wiring, etc. associated with the device.

E. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to facilities and equipment that will remain in operation following demolition. Extension of conduit and wire to equipment shall be compatible with the surrounding area. Extended conduit and conductors to match existing size and material.

F. Coordinate scope of work with all other Contractors and the Owner at the project site. Schedule removal of equipment and electrical service to avoid conflicts.

G. Bid submittal shall mean the Contractor has visited the project site and has verified existing conditions and scope of work.

3.2 PREPARATION

A. The Contractor shall obtain approval from the Owner before turning off power to circuits, feeders, panels, etc. Coordinate all outages with Owner.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Assume all equipment and systems must remain operational unless specifically noted otherwise on drawings.

D. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for removal.

E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. Service changeover shall be completed on an overtime basis.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Division 1 of Specifications and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring and raceway to source of supply. Existing conduit in good condition may be reused in place by including an equipment ground conductor in reused conduit. Reused conduit and boxes shall have supports revised to meet current codes. Relocating conduit shall not be allowed.

D. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.

E. Disconnect and remove outlets and devices that are to be demolished. Remove outlet or devices' associated back box, supports, and conduit and conductors back to source. Patch opening created from removal of device to match surrounding finishes.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories. Ballasts in light fixtures installed prior to 1980 shall be incinerated in EPA approved incinerator or disposed of in EPA certified containers and deposited in an EPA landfill certified for PCB disposal or recycled by permitted ballast recycler. Punctured or leaking ballasts must be disposed of according to Federal Regulations under the Toxic Substance Control Act. Provide Owner and Architect/Engineer with a Certificate of Destruction to verify proper disposal.

I. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide junction boxes and access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. Extended conduit and conductors to match existing size and material.

L. HID and fluorescent lamps, determined by the Toxicity Characteristic Leachate procedure (TCLP), to be hazardous waste shall be disposed of in an EPA-permitted hazardous waste disposal facility or by a permitted lamp recycler.

M. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

N. Floor slabs may contain conduit systems. This Contractor is responsible for taking any measures required to ensure no conduits or other services are damaged. This includes X-ray or similar non-destructive means. Where conduit is in concrete slab, cut conduit flush with floor, pull out conductors, and plug conduit ends.

O. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

C. ELECTRICAL ITEMS (E.G., LIGHTING FIXTURES, RECEPTACLES, SWITCHES, CONDUIT, WIRE, ETC.) REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL THE OWNER DOES NOT WANT.

3.5 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 1 of Specifications.

END OF SECTION 26 05 05

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SECTION 26 05 13 - WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire

B. Cabling for remote control, signal, and power limited circuits

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. NEMA WC 70 - Power Cables Rated 2,000V or Less for the Distribution of Electrical Energy

B. NFPA 70 - National Electrical Code (NEC)

C. UL 44 - Thermoset-Insulated Wires and Cables

D. UL 83 - Thermoplastic-Insulated Wires and Cables

E. UL 854 - Service-Entrance Cables

F. UL 1581 - Standard for Electrical Wires, Cables, and Flexible Cords

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Feeders and Branch Circuits 8 AWG and larger: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.

B. Feeders and Branch Circuits 8 AWG and larger in Underground Conduit: Copper, stranded conductor, 600-volt insulation, THWN or XHHW-2.

C. Feeders and Branch Circuits 10 AWG and Smaller: Copper, solid or stranded conductor, 600-volt insulation, THHN/THWN, unless otherwise noted on the drawings.

D. Control Circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN.

E. Each 120-volt branch circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for wire derating.

2.2 CABLING FOR REMOTE CONTROL, SIGNAL, AND POWER LIMITED CIRCUITS

A. Wire for the following specialized systems shall be as designated on the drawings, or elsewhere in these specifications. If not designated on the drawings or specifications, the system manufacturer's recommendations shall be followed.

1. Fire alarm
2. Low voltage switching and lighting control

B. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket.

C. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.

D. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION SCHEDULE

A. Above Accessible Ceilings:

1. Building wire shall be installed in raceway.

B. All Other Locations: Building wire in raceway.

C. Above Grade: All conductors installed above grade shall be type "THHN".

D. Underground or In Slab: All conductors shall be type "THWN".

E. Low Voltage Cable (less than 100 volts): Low voltage cable shall be installed in raceway.

3.2 CONTRACTOR CHANGES

A. The basis of design is copper conductors installed in raceway based on ambient temperature of 30°C, NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)). Service entrance conductors are based on copper conductor installed in underground electrical ducts, NEC Table B.2(7) (2011 - 2017 edition Table B310.15(B)(2)(7); 2008 or later edition B.301.7) or calculated in accordance with Annex B Application Information for Ampacity Calculation.

B. The Contractor shall be responsible for derating and sizing conductors and conduits to equal or exceed the ampacity of the basis of design circuits, if he/she chooses to use methods or materials other than the basis of design.

C. Conductor length(s) listed on plans and schedules. The drawings are diagrammatic with intent to convey the components of the electrical distribution system. Conductor length(s) when listed on plans and schedules are for engineering calculation purposes. Conductor length(s) shall NOT be used for bidding purposes.

D. Record drawing shall include the calculations and sketches.

3.3 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Use no wire smaller than 18 AWG for low voltage control wiring below 100 volts.

C. Use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 75 feet.

D. The ampacity of multiple conductors in one conduit shall be derated per the Electrical Code. In no case shall more than 4 conductors be installed in one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control centers, etc.

E. Splice only in junction or outlet boxes.

F. Neatly train and lace wiring inside boxes, equipment, and panelboards.

G. All conductors shall be continuous in conduit from last outlet to their termination.

H. Terminate all spare conductors on terminal blocks, and label the spare conductors.

I. Cables or wires shall not be laid out on the ground before pulling.

J. Cables or wires shall not be dragged over earth or paving.

K. Care shall be taken so as not to subject the cable or wire to high mechanical stresses that would cause damage to the wire and cable.

L. At least six (6)-inch loops or ends shall be left at each outlet for installation connection of luminaires or other devices.

M. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up, spliced if continuity of circuit is required, and insulated.

3.4 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.

B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

C. Pulling shall be continuous without unnecessary stops and starts with wire or cable only partially through raceway.

D. Where reels of cable or wire are used, they shall be set up on jacks close to the point where the wire or cable enters the conduit or duct so that the cable or wire may be unreeled and run into the conduit or duct with a minimum of change in the direction of the bend.

E. Conductors shall not be pulled through conduits until plastering or masonry work is completed and conduits are free from moisture. Care shall be taken so that long pulls of wire or pulls around several bends are not made where the wire may be permanently stretched and the insulation damaged.

F. Only nylon rope shall be permitted to pull cables into conduit and ducts.

G. Completely and thoroughly swab raceway system before installing conductors.

3.5 WIRING CONNECTIONS AND TERMINATIONS

A. Splice and tap only in accessible junction boxes.

B. Use solderless, tin-plated copper, compression terminals (lugs) applied with circumferential crimp for conductor terminations, 8 AWG and larger.

C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp for copper conductor terminations, 10 AWG and smaller.

D. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

E. Use compression connectors applied with circumferential crimp for conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

F. Thoroughly clean wires before installing lugs and connectors.

G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

H. Phase Sequence: All apparatus shall be connected to operate in the phase sequence A-B-C representing the time sequence in which the phase conductors so identified reach positive maximum voltage.

I. As a general rule, applicable to switches, circuit breakers, starters, panelboards, switchgear and the like, the connections to phase conductors are intended thus:

1. Facing the front and operating side of the equipment, the phase identification shall be:

    a. Left to Right - A-B-C
    b. Top to Bottom - A-B-C

J. Connection revisions as required to achieve correct rotation of motors shall be made at the load terminals of the starters or disconnect switches.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 1.

B. Building Wire and Power Cable Testing: Perform an insulation-resistance test on each conductor with respect to ground and adjacent conductors. Test shall be made by means of a low-resistance ohmmeter, such as a "Megger". The applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. The test duration shall be one minute. Insulation resistance must be greater than 100 mega-ohm for 600 volt and 25 mega-ohm for 300 volt rated cables per NETA Acceptance Testing Standard. Verify uniform resistance of parallel conductors.

C. Inspect wire and cable for physical damage and proper connection.

D. Torque test conductor connections and terminations to manufacturer's recommended values.

E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

F. Protection of wire and cable from foreign materials:

1. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any wire or cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid, or compound that could come in contact with the cable, cable jacket, or cable termination components.

G. Overspray of paint on any wire or cable will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed.

END OF SECTION 26 05 13

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SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment grounding system

B. Grounding electrode system

1.2 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.3 SUMMARY

A. This section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section 26 05 13 "Wire and Cable".

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated. Refer to Section 26 05 53 for insulation color.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTOR PRODUCTS

A. Comply with UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Connectors: Hydraulic compression type, in kit form, and selected per manufacturer's written instructions.

C. Bolted Connectors: Bolted-pressure-type connectors.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Sectional type; copper-clad steel.

1. Size: 3/4" in diameter by 120 inches per section.

B. Chemical Electrodes: Copper tube, straight or L-shaped, filled with nonhazardous chemical salts, terminated with a 4/0 bare conductor. Provide backfill material recommended by manufacturer.

PART 3 - EXECUTION

3.1 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

D. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

E. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

F. Structural Steel Connection: Exothermic-welded connections to structural steel. Coordinate with structure to provide physical protection.

G. Underground Connections: Exothermic-welded connections. Use for underground connections, except those at test wells.

H. Connections at back boxes, junction boxes, pull boxes, and equipment terminations: The equipment grounding conductor(s) associated with all circuits in the box shall be connected together and to the box using a suitable grounding screw. The removal of the respective receptacle, luminaire, or other device served by the box shall not interrupt the grounding continuity.

I. Tighten screws and bolts for grounding and bonding 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.

J. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.2 INSTALLATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. Each grounding conductor that passes through a below grade wall must be provided with a waterstop.

C. Grounding electrode conductor (GEC) shall be protected from physical damage by rigid polyvinyl chloride conduit (PVC) in exposed locations.

D. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then use a bolted clamp. Bond straps directly to the basic structure, taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

E. In raceways, use insulated equipment grounding conductors.

F. Underground Grounding Conductors: Use tinned copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade or bury 12 inches above duct bank when installed as part of the duct bank.

3.3 EQUIPMENT GROUNDING SYSTEM

A. Comply with Electrical Code, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by Electrical Code are indicated.

B. Install equipment grounding conductors in all feeders and circuits. Terminate each end on a grounding lug or bus.

3.4 GROUNDING ELECTRODE SYSTEM

A. Supplementary Grounding Electrode: Use driven ground rod on exterior of building.

B. Provide bonding at Utility Company's metering equipment and pad mounted transformer.

C. Ground Rods: Install at least two rods spaced at least 20 feet from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 12 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters, filtering devices, and similar equipment. Connect to pipe with grounding clamp connectors.

F. Natural Gas Service Piping: Bond to natural gas main service with grounding clamp connectors. Bonding conductor shall be connected to the main service ground bar. Provide grounding jumpers around all breaks in metallic continuity.

G. Natural Gas Equipment Piping: Bond each aboveground portion of natural gas metallic piping system at each equipment location with grounding clamp connectors. Bonding shall be performed after any flexible attachment nearest the equipment. The equipment grounding conductors may serve as the bonding means.

3.5 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

A. Pad-Mounted Transformers and Switches: Install two ground rods and counterpoise circling pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Use tinned-copper conductor not less than No. 2 AWG for counterpoise and for taps to equipment ground pad. Bury counterpoise not less than 18 inches below grade and 6 inches from the foundation. The pad rebar shall be attached to the counterpoise conductor at the four corners.

3.6 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

1. Testing: Perform the following field quality-control testing:

a. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

b. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the 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. Perform tests, by the fall-of-potential method according to IEEE 81.

c. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

    1) Equipment Rated 500 kVA and Less: 10 ohms.

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

3.7 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2. Maintain restored surfaces. Restore disturbed paving.

END OF SECTION 26 05 26

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SECTION 26 05 27 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Conduit and Equipment Supports

B. Fastening Hardware

1.2 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Allied Support Systems

B. Cooper B-Line

C. Erico, Inc.

D. Hilti

E. Power Fasteners

F. Orbit Industries

2.2 MATERIAL

A. Support Channel: Hot-dip galvanized stainless steel for wet/damp locations; painted steel for interior/dry locations. All field cut ends shall be touched up with matching finish to inhibit rusting.

B. Hardware: Corrosion resistant.

C. Anchorage and Structural Attachment Components:

1. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to Authorities Having Jurisdiction.

    a. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.

2. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
3. Welding Lugs: Comply with MSS-SP-69, Type 57.

4. Beam clamps for Steel Beams and Joists: Double sided or concentric open web joist hangars. Single-sided type is not acceptable.
5. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.
6. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.
7. Concrete Anchors: Fasten to concrete using cast-in or post-installed anchors designed per the requirements of Appendix D of ACI 318-05. Post-installed anchors shall be qualified for use in cracked concrete by ACI-355.2.
8. Masonry Anchors: Fasten to concrete masonry units with expansion anchors or self-tapping masonry screws. For expansion anchors into hollow concrete block, use sleeve-type anchors designed for the specific application. Do not fasten in masonry joints. Do not use powder actuated fasteners, wooden plugs, or plastic inserts.

D. Conduit Sleeves and Lintels:

1. Each Contractor shall provide, to the General Contractor for installation, lintels for all openings required for the Contractor's work in masonry walls and conduit sleeves for floors, unless specifically shown as being by others.
2. Lintels:

    a. Lintels in non-bearing masonry wall openings can be sized in accordance with the note below. Lintels that occur in existing bearing walls are to be sized according to similar conditions and spans in the new construction and lintel schedule. Bottom plate size shall be a minimum of 3/8" thick. The width of the plate shall be 3/4" less than the field verified wall thickness. The plate shall be the full length of the lintel member. Lintels are not required over openings that are 12" wide or less and at least 1 course below the top of the wall.
    b. All lintels shall have a minimum of 8" end bearing.
    c. All lintels in exterior wall construction shall be hot-dip galvanized.
    d. For all openings not otherwise detailed or scheduled, minimum lintels shall be for each 4 inch of masonry width:

        1) 0 to 2'-0" span: 5/16" plate (3/4" less than wall width)
        2) 2'-0" to 4'-0" span: L 3 1/2 x 3 1/2 x 1/4
        3) 4'-0" to 6'-0" span: L4 x 3 1/2 x 5/16 (llv)
        4) 6'-0" to 8'-0" span: L5 x 3 1/2 x 5/16 (llv)

    e. All angles that are back to back shall be welded top and bottom 3" at 12" minimum.

3. Fabricate all lintels from structural steel shapes or as indicated on the drawings. All lintels and grouped wall openings shall be approved by the Architect or Structural Engineer.
4. Fabricate all sleeves from standard weight black steel pipe. Provide continuous sleeve. Cut or split sleeves are not acceptable. Sleeves through concrete walls may be high density polyethylene pipe penetration sleeve with a water stop collar, suitable for use with Link-Seal mechanical seals. Century-Line Model CS.
5. Sleeves through the floors on exposed risers shall be flush with the ceiling, with planed squared ends extending 1" above the floor in unfinished areas, and flush with the floor in finished areas, to accept spring closing floor plates.
6. Sleeves shall not penetrate structural members without approval from the Structural Engineer.
7. Openings through unexcavated floors and/or foundation walls below the floor shall have a smooth finish with sufficient annular space around material passing through opening so slight settling will not place stress on the material or building structure.

8. Install all sleeves concentric with conduits. Secure sleeves in concrete to wood forms. This Contractor is responsible for sleeves dislodged or moved when pouring concrete.
9. Where conduits rise through concrete floors that are on earthen grade, provide 3/4" resilient expansion joint material (asphalt and cork) wrapped around the pipe, the full depth of concrete, at the point of penetration. Secure to prevent shifting during concrete placement and finishing.
10. Size sleeves large enough to allow expansion and contraction movement.

E. Truss and Joist Support System: Provided the installation complies with all loading requirements of truss and joist manufacturers, the following practices are acceptable:

1. Loads of 100 lbs. or less may be attached anywhere along the top or bottom chords of trusses or joists with a minimum 3' spacing between loads.
2. Loads greater than 100 lbs. must be hung concentrically and may be hung from top or bottom chord, provided one of the following conditions is met:

    a. The hanger is attached within 6" from a web/chord joint.
    b. Additional L2x2x1/4 web reinforcement is installed per manufacturer's requirements.

3. It is prohibited to cantilever a load using an angle or other structural component that is attached to a truss or joist in such a fashion that a torsional force is applied to that structural member.
4. If conditions cannot be met, coordinate installation with truss or joist manufacturer and contact Architect/Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors in concrete and beam clamps on structural steel.

B. Trapeze support installation: Cut hanger rods back at trapeze supports so they do not extend more than 3/4" below bottom face of lowest fastener and blunt any sharp edges.

C. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

D. Do not fasten supports to ceiling systems, piping, ductwork, mechanical equipment, or conduit, unless otherwise noted.

E. Do not use powder-actuated anchors without specific permission.

F. Do not drill structural steel members.

G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H. In wet locations and on all building floors below exterior earth grade install free-standing electrical equipment on concrete pads.

I. Install cabinets and panelboards with minimum of four anchors. Provide horizontal backing/support framing in stud walls for rigid mounting.

J. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

K. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.

L. Refer to Section 26 05 33 for special conduit supporting requirements.

3.2 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.

B. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

END OF SECTION 26 05 27

SECTION 26 05 33 - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rigid metallic conduit and fittings (RMC)

B. Electrical metallic tubing and fittings (EMT)

C. Flexible metallic conduit and fittings (FMC)

D. Rigid polyvinyl chloride conduit and fittings (PVC)

E. Wall and ceiling outlet boxes

F. Electrical connection

G. Pull and junction boxes

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
3. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
4. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports

B. Federal Specifications (FS):

1. A-A-50553A - Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall (EMT) Type
2. A-A-55810 - Specification for Flexible Metal Conduit

C. NECA "Standards of Installation"

D. National Electrical Manufacturers Association (NEMA):

1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
2. RN 1 - Polyvinyl chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit, Rigid Aluminum Conduit, and Intermediate Metal Conduit
3. TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit
4. TC 9 - Fittings for PVC Plastic Utilities Duct for Underground Installation

E. NFPA 70 - National Electrical Code (NEC)

F. Underwriters Laboratories (UL): Applicable Listings

1. UL 1 - Flexible Metal Conduit
2. UL 6 - Rigid Metal Conduit
3. UL514-B - Conduit Tubing and Cable Fittings
4. UL797 - Electrical Metal Tubing

G. Definitions:

1. Fittings: Conduit connection or coupling.
2. Body: Enlarged fittings with opening allowing access to the conductors for pulling purposes only.
3. Mechanical Spaces: Enclosed areas, usually kept separated from the general public, where the primary use is to house service equipment and to route services. These spaces generally have exposed structures, bare concrete and non-architecturally emphasized finishes.
4. Finished Spaces: Enclosed areas where the primary use is to house personnel and the general public. These spaces generally have architecturally emphasized finishes, ceilings and/or floors.
5. Concealed: Not visible by the general public. Often indicates a location either above the ceiling, in the walls, in or beneath the floor slab, in column coverings, or in the ceiling construction.
6. Above Grade: Not directly in contact with the earth. For example, an interior wall located at an elevation below the finished grade shall be considered above grade but a wall retaining earth shall be considered below grade.
7. Slab: Horizontal pour of concrete used for a floor or sub-floor.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS

A. Manufacturers:

1. Allied
2. LTV
3. Steelduct
4. Calbond Calpipe
5. Wheatland Tube Co
6. O-Z Gedney
7. or approved equal.

B. Manufacturers of RMC Conduit Fittings:

1. Appleton Electric
2. O-Z/Gedney Co.
3. Electroline
4. Raco
5. Bridgeport
6. Midwest
7. Regal
8. Thomas & Betts
9. Crouse-Hinds
10. Killark
11. Orbit Industries

12. or approved equal.

C. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.

D. Fittings and Conduit Bodies:

1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.
3. Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with bronze end coupling, stainless steel bands and tinned copper braid bonding jumper. Fittings shall be watertight and concrete-tight.
4. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. High impact phenolic threaded type bushings are not acceptable.
5. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.

B. Manufacturers of EMT Conduit:

1. Allied
2. Calbond Calpipe
3. LTV
4. Steelduct
5. Wheatland Tube Co
6. or approved equal.

C. Fittings and Conduit Bodies:

1. 2" Diameter or Smaller: Compression or steel set screw type of steel designed for their specific application.
2. Larger than 2": Compression or steel set screw type of steel designed for their specific application.
3. Manufacturers of EMT Conduit Fittings:

    a. Appleton Electric
    b. O-Z/Gedney Co.
    c. Electroline
    d. Raco
    e. Bridgeport
    f. Midwest
    g. Regal
    h. Thomas & Betts
    i. Orbit Industries
    j. or approved equal.

2.3 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS

A. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted. Lighting branch circuit wiring to an individual luminaire may be a manufactured, UL listed 3/8" flexible metal conduit and fittings with #14 AWG THHN conductors and an insulated ground wire. Maximum length of 3/8" FMC shall be six (6) feet.

B. Manufacturers:

1. American Flex
2. Alflex
3. Electri-Flex Co
4. or approved equal.

C. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel. Provide a separate equipment grounding conductor when used for equipment where flexibility is required.

D. Fittings and Conduit Bodies:

1. Threadless hinged clamp type, galvanized zinc coated cadmium plated malleable cast iron or screw-in type, die-cast zinc.
2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
3. Manufacturers:

a. O-Z/Gedney Co.
b. Thomas & Betts
c. Appleton Electric
d. Electroline
e. Bridgeport
f. Midwest
g. Regal
h. Orbit Industries
i. or approved equal.

2.4 RIGID NON-METALLIC CONDUIT (PVC) AND FITTINGS

A. Minimum Size Rigid Smooth-Wall Nonmetallic Conduit: 3/4 inch, unless otherwise noted.

B. Acceptable Manufacturers:

1. Carlon (Lamson & Sessions) Type 40
2. Cantex, J.M. Mfg.
3. or approved equal.

C. Construction: Schedule 40 and Schedule 80 rigid polyvinyl chloride (PVC), UL labeled for 90°C.

D. Fittings and Conduit Bodies: NEMA TC 3; sleeve type suitable for and manufactured especially for use with the conduit by the conduit manufacturer.

E. Plastic cement for joining conduit and fittings shall be provided as recommended by the manufacturer.

2.5 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, 16 gauge (approximately 0.0625 inches), with 1/2-inch male fixture studs where required.

B. Cast Boxes: NEMA FB1, Type FD, Aluminum, cast feralloy, or stainless steel deep type, gasketed cover, threaded hubs.

C. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the number of wires or construction. The box shall be coordinated with surface luminaires to conceal the box from view or provide a finished trim plate.

D. Switch outlet boxes for local light control switches, dimmers and occupancy sensors shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required number of gang boxes appropriate to the quantity of switches comprising the gang. Where walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur in exposed concrete block walls, boxes shall be installed in the block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block or masonry boxes.

E. Outlet boxes for telephone substations in walls and columns shall be 4 inches square and 2-1/8 inches deep with single gang raised cover to fit flush with finished wall line equipped with flush telephone plate.

F. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to fit flush with finished wall line. Boxes in concrete block walls shall be installed the same as for switch boxes in block walls.

2.6 ECONN; ELECTRICAL CONNECTION

A. Electrical connection to equipment and motors, sized per Electrical Code. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.7 JB; PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.

B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.

E. Flanged type boxes shall be used where installed flush in wall.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION SCHEDULE AND SIZING

A. In the event the location of conduit installation represents conflicting installation requirements as specified in the following schedule, a clarification shall be obtained from the Architect/Engineer. If this Contractor is unable to obtain a clarification as outlined above, concealed rigid galvanized steel conduit installed per these specifications and the Electrical Code shall be required.

B. Installation Schedule: Refer to drawings.

C. Size conduit as shown on the drawings and specifications. Where not indicated in the contract documents, conduit size shall be according to the Electrical Code. Conduit and conductor sizing shall be coordinated to limit conductor fill to less than 40%, maintain conductor ampere capacity as required by the Electrical Code (to include enlarged conductors due to temperature and quantity derating values) and to prevent excessive voltage drop and pulling tension due to long conduit/conductor lengths.

D. Minimum Conduit Size (Unless Noted Otherwise):

1. Above Grade: 3/4 inch. (The use of 1/2 inch would be allowed for installation conduit to individual light switches, individual receptacles and individual fixture whips from junction box.)
2. Below Grade 5' or less from Building Foundation: 1 inch.
3. Below Grade More than 5' from Building Foundation: 1 inch.
4. Controls Conduit: 3/4 inch.

E. Conduit sizes shall change only at the entrance or exit to a junction box, unless specifically noted on the drawings.

3.2 CONDUIT ARRANGEMENT

A. In general, conduit shall be installed concealed in walls, in finished spaces and where possible or practical, or as noted otherwise. Conduit shall be installed parallel or perpendicular to walls, ceilings, and exposed structural members. In unfinished spaces, mechanical and utility areas, conduit may run either concealed or exposed as conditions dictate and as practical unless noted otherwise on drawings. Installation shall maintain headroom in exposed vicinities of pedestrian or vehicular traffic.

B. Exposed conduit on exterior walls or above roof will not be allowed without prior written approval of Architect/Engineer. A drawing of the proposed routing and a photo of the location shall be submitted 14 days prior to start of conduit rough-in. Routing shall be shown on coordination drawings.

C. Conduit shall not share the same cell as structural reinforcement in masonry walls.

D. Conduit runs shall be routed as shown on large scale drawings. Conduit routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted otherwise. The correct routing, when shown diagrammatically shall be chosen by the Contractor based on information in the contract documents, in accordance with manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", in accordance with recognized industry standards, and coordinated with other contractors.

E. Contractor shall adapt Contractor's work to the job conditions and make such changes as required and permitted by the Architect/Engineer, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, etc., to permit the proper installation of other mechanical and/or electrical equipment.

F. Contractor shall cooperate with all contractors on the project. Contractor shall obtain details of other contractor's work to ensure fit and avoid conflict. Any expense due to the failure of This Contractor to do so shall be paid for in full by Contractor. The other trades involved as directed by the Architect/Engineer shall perform the repair of work damaged as a result of neglect or error by This Contractor. The resultant costs shall be borne by This Contractor.

3.3 CONDUIT SUPPORT

A. Conduit runs installed above a suspended ceiling shall be properly supported. In no case shall conduit rest on the suspended ceiling construction, nor utilize ceiling support system for conduit support.

1. Support wire used to independently support raceway and wiring systems above suspending ceilings shall be supported on both ends, minimum 12 gauge suspended ceiling support wire, and distinguishable from ceiling support systems by color (field paint), tagging, or equivalent means.

B. Conduit shall not be supported from ductwork, water, sprinkler piping, or other non-structural members, unless approved by the Architect/Engineer. All supports shall be from structural slabs, walls, structural members, and bar joists, and coordinated with all other applicable contractors, unless noted otherwise.

C. Conduit shall be held in place by the correct size of galvanized one-hole conduit clamps, two-hole conduit straps, patented support devices, clamp back conduit hangers, or by other means if called for on the drawings.

D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

E. Spring-steel conduit clips specifically designed for supporting single conduits or tubing may be used in lieu of malleable-iron hangers for 1-1/2" and smaller raceways serving lighting and receptacle branch circuits above accessible ceilings and for securing raceways to slotted channel and angle supports.

F. Group conduits in parallel runs where practical and use conduit racks or trapeze hangers constructed of steel channel, suspended with threaded solid rods or wall mounted from metal channels with conduit straps or clamps. Provide space in each rack or trapeze for 25% additional conduits.

G. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may be used if necessitated by building construction, but in no event shall support spans exceed the Electrical Code requirements. Conduit shall be securely fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.

J. Supports of flexible conduit shall be within 12 inches of each outlet box, junction box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.

K. Where conduit is to be installed in poured concrete floors or walls, provide concrete-tight conduit inserts securely fastened to forms to prevent conduit misplacement.

L. Finish:

1. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.
2. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

3.4 CONDUIT INSTALLATION

A. Conduit Connections:

1. Shorter than standard conduit lengths shall be cut square using industry standards. The ends of all conduits cut shall be reamed or otherwise finished to remove all rough edges.
2. Metallic conduit connections in slab on grade installation shall be sealed and one coat of rust inhibitor primer applied after the connection is made.
3. Where conduits with tapered threads cannot be coupled with standard couplings, then approved split or Erickson couplings shall be used. Running threads will not be permitted.
4. Install expansion/deflection joints where conduit crosses structure expansion/seismic joints.

B. Conduit terminations for all low voltage wiring shall have nylon bushings installed on each end of every conduit run.

C. Conduit Bends:

1. Use a hydraulic one-shot conduit bender or factory elbows for bends in conduit 2" in size or larger. All steel conduit bending shall be done cold; no heating of steel conduit shall be permitted.
2. All bends of rigid polyvinyl chloride conduit (PVC) shall be made with the manufacturer's approved bending equipment. The use of spot heating devices will not be permitted (i.e. blow torches).
3. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360°), including those bends located immediately at the outlet or body.
4. Rigid polyvinyl chloride conduit (PVC) runs longer than 100 feet or runs which have more than two 90° equivalent bends (regardless of length) shall use rigid metal or RTRC factory elbows for bends.
5. Use conduit bodies to make sharp changes in direction (i.e. around beams).

D. Conduit Placement:

1. Conduit shall be mechanically continuous from source of current to all outlets. Conduit shall be electrically continuous from source of current to all outlets, unless a properly sized grounding conductor is routed within the conduit. All metallic conduits shall be bonded per the Electrical Code.

2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water and steam piping.
3. Route conduit through roof openings provided for piping and ductwork where possible. If not provided or routing through provided openings is not possible, route through roof jack with pitch pocket. Coordinate roof penetrations with other trades.
4. Conduits, raceway, and boxes shall not be installed in concealed locations in metal deck roofing or less than 1.5" below bottom of roof decking.
5. Avoid moisture traps where possible. Where unavoidable, provide a junction box with drain fitting at conduit low point.
6. All conduits through walls shall be grouted or sealed into openings. Where conduit penetrates firewalls and floors, seal with a UL listed sealant. Seal penetrations with intumescent caulk, putty, or sheet installed per manufacturer's recommendations. All materials used to seal penetrations of firewalls and floors shall be tested and certified as a system per ASTM E814 Standard for fire tests or through-penetration fire stops as manufactured by 3M or approved equal.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
8. Seal interior of conduit at exterior entries, air handling units, coolers/freezers, etc., and where the temperature differential can potentially be greater than 20°F, to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, identified for use with cable and raceway system.
9. Rigid polyvinyl chloride conduit (PVC) shall be installed when material surface temperatures and ambient temperature are greater than 40°F.
10. Where rigid polyvinyl chloride conduit (PVC) is used below grade, in a slab, below a slab, etc., a transition to rigid galvanized steel conduit shall be installed before conduit exits earth. The conduit shall extend a minimum of 6" into the surface concealing the non-metallic conduit.
11. Contractor shall provide suitable mechanical protection around all conduits stubbed out from floors, walls or ceilings during construction to prevent bending or damaging of stubs due to carelessness with construction equipment.
12. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile strength in each empty conduit (indoor and outdoor), except in sleeves and nipples.

3.5 CONDUIT TERMINATIONS

A. Where conduit bonding is indicated or required in the contract documents, the bushings shall be a grounding type sized for the conduit and ground bonding conductor as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, Burndy, Regal, Orbit Industries or approved equal.

B. Conduits with termination fittings shall be threaded for one (1) lock nut on the outside and one (1) lock nut and bushing on the inside of each box.

C. Where conduits terminate in boxes with knockouts, they shall be secured to the boxes with lock nuts and provided with approved screw type tinned iron bushings or fittings with plastic inserts.

D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they shall be tightly screwed against the shoulder portion of the threaded openings.

E. Conduit terminations to all motors shall be made with flexible metallic conduit (FMC), unless noted otherwise. Final connections to roof exhaust fans, or other exterior motors and motors in damp or wet locations shall be made with liquidtight flexible metallic conduit (LFMC). Motors in hazardous areas, as defined in the Electrical Code, shall be connected using flexible conduit rated for the environment. Flexible conduit shall not exceed 6' in length. Route equipment ground conductors from circuit ground to motor ground terminal through flexible conduit.

F. Rigid polyvinyl chloride conduit (PVC) shall be terminated using fittings and bodies produced by the manufacturer of the conduit, unless noted otherwise. Prepare conduit as per manufacturer's recommendations before joining. All joints shall be solvent welded by applying full even coat of plastic cement to the entire areas that will be joined. Turn the conduit at least a quarter to one half turn in the fitting and let the joint cure for 1-hour minimum or as per the manufacturer's recommendations.

G. All conduit ends shall be sealed with plastic immediately after installation to prevent the entrance of any foreign matter during construction. The seals shall be removed and the conduits blown clear of all foreign matter prior to any wires or pull cords being installed.

3.6 UNDERGROUND CONDUIT INSTALLATION

A. Conduit Connections:

1. Conduit joints in a multiple conduit run shall be staggered at least one foot apart.

B. Conduit Bends (Lateral):

1. Conduits shall have long sweep radius elbows instead of standard elbows wherever special bends are indicated and noted on the drawings, or as required by the manufacturer of the equipment or system being served.
2. Telecommunications conduit bend radius shall be six times the diameter for conduits under 2" and ten times the diameter for conduits over 2". Where long cable runs are involved, sidewall pressures may require larger radius bends. Coordinate with Architect/Engineer prior to conduit installation to determine bend radius.

C. Conduit Elbows (vertical):

1. Minimum metal or RTRC elbow radiuses shall be 30 inches for primary conduits (greater than 600V) and 18 inches for secondary conduits (less than 600V). Increase radius, as required, based on pulling tension calculation requirements.

D. Expansion Fittings at Finished Grade: Provide underground raceways with an expansion fitting after emerging from finished grade and exterior equipment pads. Field locate the expansion fitting above and within 24 inches of finished grade. Raceways extending less than 12 inches above finished grade, transitioning to LFMC within 12 inches of finished grade, and interior concrete building slabs do not require an expansion fitting unless required by code.

E. Conduit Placement:

1. Conduit runs shall be pitched a minimum of 4" per 100 feet to drain toward the terminations. Duct runs shall be installed deeper than the minimum wherever required to avoid any conflicts with existing or new piping, tunnels, etc.
2. For parallel runs, use suitable separators and chairs installed not greater than 4' on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement or backfilling.

3. Where concrete is required, the materials for concreting shall be thoroughly mixed to a minimum f'c = 2500 and immediately placed in the trench around the conduits. No concrete that has been allowed to partially set shall be used.
4. Before the Contractor pulls any cables into the conduit, Contractor shall have a mandrel 1/4" smaller than the conduit inside diameter pulled through each conduit and if any concrete or obstructions are found, the Contractor shall remove them and clear the conduit. Spare conduit shall also be cleared of all obstructions.
5. Conduit terminations in manholes, masonry pull boxes, or masonry walls shall be with malleable iron end bell fittings.
6. All spare conduits not terminated in a covered enclosure shall have its terminations plugged as described above.
7. Ductbanks and conduit shall be installed a minimum of 24" below finished grade, unless otherwise noted on the drawings or elsewhere in these specifications.
8. All non-metallic conduit installed underground outside of a slab shall be rigid.

F. Horizontal Directional Drilling:

1. Entire drill path shall be accurately surveyed, with entry and exit stakes placed and coordinated with other contractors. If using a magnetic guidance system, entire drill path shall be surveyed for any surface geo-magnetic variations or anomalies.
2. Any utility locates within 20 feet of the bore path shall have the exact location physically verified by hand digging or vacuum excavation. Restore inspection holes to original condition after verification.

G. Raceway Seal (Exterior to Raceway):

1. All power, telecommunication, electrical conduits and innerducts shall be sealed between the raceway and the building foundation. The raceway penetration shall be sealed liquid-tight, water-tight, non-corrosive.
2. Below Grade Installation Options:

    a. Cast-in-place concrete installation.
    b. Hydraulic cement, hydraulic group, hydraulic epoxy.
    c. Foundation - Underground Sleeves and Seals; refer to Part 2-Products for product information.

3. Above Grade Installation Options:

    a. Masonry grout for masonry applications.
    b. Caulk Sealant, interior/exterior rated, color per architect. Approved Manufacturers include Sachco, Tremco Vulkem, Sika or approved equal when not specified by architectural scope.

H. Raceway Seal (Interior to Raceway, with Cables or Empty):

1. All power, telecommunication, electrical conduits and innerducts, including those with cables, shall be sealed at the building and vault entry. The seal shall prevent the entry of liquids or gases. Seal must be compatible with conductors and raceway system. Spare or unused raceways shall also be sealed.

2. Installation Schedule, nominal size:

    a. 2" or less: Duct Seal Bushing or Duct Sealnt
    b. 2-1/2" through 4": Duct Seal Bushing
    c. 5" and 6": Wall Sleeve Duct Seal System

3.7 BOX INSTALLATION SCHEDULE

A. Galvanized steel boxes may be used in:

1. Concealed interior locations above ceilings and in hollow studded partitions.
2. Exposed interior locations in mechanical rooms and in rooms without ceilings; higher than 8' above the highest platform level.
3. Direct contact with concrete except slab on grade.

B. Cast boxes shall be used in:

1. Exterior locations.
2. Exposed interior locations within 8' of the highest platform level.
3. Direct contact with earth.
4. Direct contact with concrete in slab on grade.
5. Wet locations.

3.8 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on the Contract Drawings are approximate, unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

C. Locate and install boxes to allow access. Avoid interferences with ductwork, piping, structure, equipment, etc. Recessed luminaires shall not be used as access to outlet, pull, and junction boxes. Where installation is inaccessible, provide access doors. Coordinate locations and sizes of required access doors with the Architect/Engineer and General Contractor.

D. Locate and install to maintain headroom and to present a neat appearance.

3.9 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls.

1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls.
2. Provide a minimum horizontal separation of 24 inches between boxes installed on opposite sides of fire-rated walls. When the minimum separation cannot be maintained, the box is greater than 16 square inches or the total box area (all trades) per 100 square feet is greater than or equal to 100 square inches, install fire-rated moldable pads to all five sides of the back box to maintain the fire rating of the wall. Install moldable pads in accordance with UL listing for the specific product. Sound insulation pads are not acceptable for use in fire-rated wall applications unless the product carries the necessary fire rating.

B. The Contractor shall anchor switch and outlet box to wall construction so that it is flush with the finished masonry, paneling, drywall, plaster, etc. The Contractor shall check the boxes as the finish wall surface is being installed to assure that the box is flush. (Provide plaster rings as necessary.)

C. Mount at heights shown or noted on the drawings or as generally accepted if not specifically noted.

D. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.

E. Provide knockout closures for unused openings.

F. Support boxes independently of conduit.

G. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

H. Install boxes in walls without damaging wall insulation.

I. Coordinate mounting heights and locations of outlets mounted above counters, benches, backsplashes, and below baseboard radiation.

J. Position outlets to locate luminaires as shown on reflected ceiling drawings.

K. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

L. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

M. Provide cast outlet boxes in exterior locations and wet locations, and where exposed rigid or intermediate conduit is used.

3.10 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Do not install boxes back-to-back in walls.

1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls.
2. Provide a minimum horizontal separation of 24 inches between boxes installed on opposite sides of fire-rated walls. When the minimum separation cannot be maintained, the box is greater than 16 square inches or the total box area (all trades) per 100 square feet is greater than or equal to 100 square inches, install fire-rated moldable pads to all five sides of the back box to maintain the fire rating of the wall. Install moldable pads in accordance with UL listing for the specific product. Sound insulation pads are not acceptable for use in fire-rated wall applications unless the product carries the necessary fire rating.

3.11 EXPOSED BOX INSTALLATION

A. Boxes shall be secured to the building structure with proper size screws, bolts, hanger rods, or structural steel elements.

B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal screw anchors or expansion shields and round head machine screws. Cast boxes shall not be drilled.

C. On steel structures, exposed boxes shall be supported to the steel member by drilling and tapping the member and fastening the boxes by means of round head machine screws.

D. Boxes may be supported on steel members by APPROVED beam clamps if conduit is supported by beam clamps.

E. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood screws adequately large and long to properly support. (Quantity depends on size of box.)

F. Wood, plastic, or fiber plugs shall not be used for fastenings.

G. Explosive devices shall not be used unless specifically allowed.

END OF SECTION 26 05 33

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Adhesive Markings and Field Labels

B. Nameplates and Signs

C. Product Colors

1.2 REFERENCES

A. NFPA 70E - National Electrical Safety Code

B. NFPA 70 - National Electrical Code (NEC)

C. CEC California Electrical Code

D. ANSI A13.1 - Standard for Pipe Identification

E. ANSI Z535.4 - Standard for Product Safety Signs and Labels

1.3 QUALITY ASSURANCE

A. Electrical identification products shall be suitable for the environment installed. Identification labels damaged by the environment due to ultraviolet light fading, damp or wet conditions, physical damage, corrosion, or other conditions shall be replaced with labels suitable for the environment.

PART 2 - PRODUCTS

2.1 ADHESIVE MARKINGS AND FIELD LABELS

A. Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

B. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification: flexible acrylic bands sized to suit the cable diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the cable.

C. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.

D. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from -40°F to 185°F (-40°C to 85°C), type 2/2S or type 21/21S based on application. Provide ties in specified colors when used for color coding. Cable ties shall be listed and identified for the application, securement, and support.

E. Underground Plastic Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inches wide by 4 mil thick, printed legend indicating type of underground line, manufactured for direct burial service. Tape shall contain a continuous metallic wire to allow location with a metal detector.

F. Aluminum, Wraparound Marker Bands: 1-inch width, 0.014 (5mm) inch thick aluminum bands with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

G. Brass or Aluminum Tags: 2" (50mm) by 2" (50mm) by .05-inch metal tags with stamped legend, punched for fastener.

H. Indoor/Outdoor Number and Letters: Outdoor grade vinyl label with acrylic adhesive designed for permanent application in severe indoor and outdoor environments.

2.2 NAMEPLATES AND SIGNS

A. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Labels shall be punched for mechanical fasteners.

B. Baked-Enamel Signs for interior Use: Preprinted aluminum signs, punched, or drilled for fasteners, with colors, legend, and size required for application. Mounting ¼" grommets in corners.

C. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch galvanized-steel backing: and with colors, legend, and size required for application. Mounting 1/4" grommets in corners.

D. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

E. Fasteners for Plastic-Laminated Signs; Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

2.3 PRODUCT COLORS

A. Adhesive Markings and Field Labels:

1. Normal Power and General Labels: Black letters on white face
2. Control Labels: Black letters on white face
3. Fire Alarm: Red letters on white face

B. Nameplates and Signs:

1. NORMAL POWER: Black letters on white face
2. Control Labels: Black letters on white face

C. Raceways and Conduit:

1. Provide color coded conduit as indicated below. Conduit shall be colored by the manufacturer:

a. Normal Power and General Distribution: Silver
b. Fire Alarm System: Red
c. Temperature Controls: Refer to mechanical cover sheet for color

D. Box Covers:

1. Box cover colors shall match conduit colors listed above.

E. Conductor Color Identification: Refer to Part 3 for additional information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as required by code.

B. Exposed Ceilings and Finished Spaces: The project includes exposed ceilings in finished spaces. The installation of colored raceways and labeling may not be aesthetically desirable in finished spaces. The contractor shall coordinate identification requirements in exposed ceilings of finished spaces with the Architect/Engineer prior to installation and ordering of materials.

C. Install identification devices in accordance with manufacturer's written instruction and requirements of Electrical Code.

D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. All mounting surfaces shall be cleaned and degreased prior to identification installation.

E. Circuit Identification: Tag or label conductors as follows:

1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple branch circuits are terminated or spliced in a box or enclosure, label each conductor with source and circuit number.
2. Multiple Control Wiring and Communication/Signal Circuits in Same Enclosure: For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tape.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

F. Apply Danger, Warning, Caution and instruction signs as follows:

1. Install Danger, Warning, Caution or instruction signs where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
2. 'Danger' indicates a hazardous situation which, if not avoided, will result in death or serious injury. ANSI standard red background, white letters.
3. 'Warning' indicates a hazardous situation which, if not avoided, could result in death or serious injury. ANSI standard orange background, black letters.
4. 'Caution' indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. ANSI standard yellow background, black letters.
5. Emergency Operating Signs: Install, where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect, engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

G. Apply circuit/control/item designation labels of engraved plastic laminate for pushbuttons, pilot lights, alarm/signal components, and similar items, except where labeling is specified elsewhere.

H. Install labels parallel to equipment lines at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

I. Install ARC FLASH WARNING signs on all branch panelboards.

1. Sample Label:
   ! WARNING
   ARC FLASH AND SHOCK HAZARD
   APPROPRIATE PPE REQUIRED
   FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY
   REFER TO NFPA 70E

J. Underground Electrical Lines: For exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 (150mm) to 8 (205mm) inches below grade. A single plastic line marker is permitted when the width of the common trench does not exceed 16 inches; provide a second plastic line marker to mark each edge of the trench when 16 inches of width is exceeded.

3.2 FEEDER AND BRANCH CIRCUIT DIRECTORIES

A. Product:

1. Adhesive labels and field markings
2. Nameplates and signs

B. Feeder Directories Branch: Provide each feeder, branch circuit, feeder modification, and branch circuit modification with a typed circuit directory label. Refer to technical equipment specification sections for additional requirements. Include the following with each label:

1. Load Description: Lighting, receptacles, specific equipment, spare, space, or similar description.

2. Location: Room name, number, location.

C. Provide a factory or custom clear plastic sleeve for each branch panel directory and secure to inside panel cover.

3.3 LIGHTING CONTROL AND RECEPTACLE COVER PLATES

A. Identification material to be a clear, 3/8-inch Kroy tape or Brother self-laminating vinyl label with black letters. Embossed Dymo-Tape labels are not acceptable. Permanently affix identification label to cover plates, centered above the receptacle openings.

B. Provide identification on all switch and receptacle cover plates. Identification shall indicate source and circuit number serving the device (e.g. "C1A #24").

3.4 BOX LABELING

A. Identify Junction, Pull and Connection Boxes: Labeling shall be 3/8-inch Kroy tape OR Brother self-laminating vinyl label, letters/numbers color coded same as conduits. In rooms that are painted out, provide labeling on inside of cover.

B. All junction, pull, and connection boxes shall be identified as follows:

1. For power and lighting circuits, indicate system voltage and identity of contained circuits ("120V, 1LA1-3,5,7").
2. For other wiring, indicate system type and description of wiring ("FIRE ALARM NAC #1").

3.5 CONDUCTOR COLOR CODING

A. Color coding shall be applied at all panels, switches, junction boxes, pull boxes, vaults, manholes etc., where the wires and cables are visible and terminations are made. The same color coding shall be used throughout the entire electrical system, therefore maintaining proper phasing throughout the entire project.

B. Colored cable ties shall be applied in groups of three ties of specified color to each conductor at each terminal or splice point starting 3 inches from the termination and spaced at 3- inches centers. Tighten to a snug fit, and cut off excess length.

C. Where more than one nominal voltage system exists in a building or facility, each ungrounded conductor of a multi-wire branch circuit, where accessible, shall be identified by phase and system.

D. Conductors shall be color coded as follows:

1. 208Y/120 Volt, 4-Wire:

   a. A-Phase - Black
   b. B-Phase - Red
   c. C-Phase - Blue
   d. Neutral - White
   e. Ground Bond - Green

2. Grounding Conductors:

a. Equipment grounding conductors, main/system/supply-side bonding jumpers: Green.

3. Cabling for Remote Control, Signal, and Power Limited Circuits:

a. Fire Alarm: Red.
b. Low Voltage Switching: Per manufacturer recommendations and code requirements.

3.6 CONTROL EQUIPMENT IDENTIFICATION

A. Provide identification on the front of all control equipment such as combination starters, starters, VFDs, contactors, motor control centers, etc.

B. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner.

C. Labeling shall include:

1. Equipment type and contract documents designation of equipment being served.
2. Location of equipment being served if it is not located within sight.
3. Voltage and phase of circuit(s).
4. Panel and circuit number(s) serving the equipment.
5. Available fault current; refer to one-line diagram or panel schedule of panel serving equipment.
6. Sample Label:

EXHAUST FAN EF-1 ("LOCATED ON ROOF")
480V, 3-PHASE
FED FROM "1HA1-1"
AUTO CONTROL BY FMCS

3.7 EQUIPMENT CONNECTION IDENTIFICATION

A. Provide identification for hard wired electrical connections to equipment such as disconnects switches, starters, etc. Plug and cord type connections do not require this specific label.

B. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner. The following list of equipment is specifically being listed to receive an equipment connection label; this list does not limit the equipment that shall receive a label:

1. Mechanical heating, ventilation, and air conditioning equipment; chillers, boilers, pumps, air handing ventilation units, condensing units, unit heaters, and similar equipment
2. Plumbing equipment

C. Labeling shall include:

1. Equipment type and contract documents designation of equipment being served
2. Location of equipment being served if it is not located within sight.
3. Voltage and rating of the equipment.
4. Panel and circuit numbers(s) serving the equipment

5. Sample Label:

   UNIT HEATER UH-1 ("LOCATED IN STORAGE ROOM 200")
   480V: 3-PHASE
   FED FROM "1HA1-1"

3.8 POWER DISTRIBUTION EQUIPMENT IDENTIFICATION

A. Provide identification on the front of all power distribution equipment such as panelboards, switchboards, switchgear, motor control centers, generators, UPS, storage battery disconnects, transfer switches, etc. Labels shall be visible on the exterior of the gear, correspond to the one-line diagram nomenclature, and identify each cubicle of multi-section gear.

1. Interior Equipment: The identification material shall be engraved plastic-laminated labels.
2. Exterior Equipment: The identification material shall be engraved vinyl labels.
3. Labeling shall include:

   a. Equipment type and contract documents designation of equipment.
   b. Voltage of the equipment.
   c. Name of the upstream equipment and location of the upstream equipment if it is not located within sight.
   d. Sample Label:

      DISTRIBUTION PANEL DP-H1
      480Y/277V
      FED FROM SWITCHBOARD "SB-1" (LOCATED IN MAIN ELEC ROOM)

4. Provide the following on a separate label, installed below the label above:

   a. Available fault current
   b. Date of fault current study
   c. Sample Label:

      22,000 AMPS AVAILABLE FAULT CURRENT
      DATE OF STUDY: 1 JAN 2017

B. Service Equipment Label: A separate nameplate for the service entrance equipment and include:

1. Nominal system voltage, service wire size, quantity, material, distance
2. Maximum available fault current; refer to one-line diagram for values
3. Clearing time of overcurrent protection devices based on available fault current. Refer to calculations and report from Section 26 05 73 for value.
4. Date of label
5. Sample Label:

   480Y/277V, 6 SETS 4#750KCM CU, 75FT
   0.07 SECOND CLEARING TIME
   DATE OF LABEL: 4 JUL 2017

C. Branch panelboards shall be provided with typed panel schedules upon completion of the project. Existing panelboards shall have their existing panel schedules typed, with all circuit changes, additions or deletions also typed on the panel schedules. A copy of all panel schedules for the project shall be turned over as part of the O&M Manuals. Refer to Section 26 05 00 for other requirements.

3.9 ELECTRICAL WORKING CLEARANCE IDENTIFICATION

A. Products:

1. Safety Yellow paint and custom stencils

B. Provide custom identification of electrical equipment working clearances in mechanical, electrical, storage, janitorial, and similar non-public areas.

C. Identification shall include a painted rectangular box (on the finished floor) in front of the electrical equipment to define the code-required working clearance. Provide additional diagonal stripping inside the rectangle box. All painted stripping shall be safety yellow paint with 3 inch wide stripes.

1. Width of area: Width of equipment or as required by code
2. Depth of area: Depth as required by code

END OF SECTION 26 05 53

SECTION 26 09 34 - LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Line and low voltage standalone lighting controls

1.2 RELATED SECTIONS

A. The lighting system design includes a combination of luminaire sources, lighting control components, programming sequences, and supplementary components for building and energy code compliance. The design uses performance-based specifications for portions of the lighting system to account for the limitation of comparable product solutions available by competitive manufacturers. The Contractor shall reference related specification sections, plans, schedules, and details prior to submitting pricing, submittals, and installation. The Contractor shall coordinate system component compatibility among various manufacturers and suppliers for a turnkey lighting system. Referenced sections include, but are not limited to, the following:

1. 26 51 19 LED Lighting
2. Electrical Drawings: Plans, luminaire schedules, lighting control sequence of operations, diagrams, and details.

1.3 QUALITY ASSURANCE

A. Manufacturers shall be regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. All components and assemblies are to be factory pre-tested prior to delivery and installation.

C. Comply with Electrical Code as applicable to electrical wiring work.

D. Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.

E. Panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Panels and accessories used for control of life safety and critical branch circuits shall be listed under UL 924 Emergency Lighting and Power Equipment.

F. All assemblies are to be in compliance with FCC emissions standards specified in Part 15 Subpart J for Class A applications.

1.4 REFERENCES

A. FCC Rules and Regulations, Part 15, Subpart J - Radio Frequency Interference

B. FS W S 896 Switch, Toggle

C. International Energy Conservation Code (IECC)

D. NEMA WD 1 - General Color Requirements for Wiring Devices

E. NEMA WD 7 - Occupancy Motion Sensors

F. NFPA 70 - National Electrical Code (NEC)

G. UL Standard 916 Energy Management Equipment

H. UL 924 - Emergency Lighting and Power Equipment

I. UL 1472 - Solid-State Dimming Controls

1.5 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Submit a comprehensive package including devices, hardware, software, product specification, finishes, dimensions, installation instructions, warranty, system software requirements.

C. Provide floor plan showing location, orientation, and coverage area of each control device, sensor, and controller/interface. For areas requiring multiple sensor devices for appropriate coverage, submit specific manufacturer-approved sensor layout as an overlay directly on the project drawings, either in print or approved electronic form.

D. Submit a list of devices and equipment that will be installed for each sequence of operation.

E. Submit project specific control wiring diagrams showing all equipment, line voltage, and control wiring requirements for all components including, but not limited to, dimmers, relays, low voltage switches, occupancy sensors, control stations, and communication interfaces and programming instructions for each sequence of operation. Include network cable specification and end-of-line termination details, if required.

1.6 PROJECT RECORD DOCUMENTS

A. Submit project record documents under provisions of Section 26 05 00.

B. Accurately record location of all controls and devices. Include description of switching sequences and circuiting arrangements.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit emergency, operation, and maintenance data under provisions of Section 26 05 00. Data shall also include the following:

1. Schedule for routine maintenance, inspection, and calibration of all lighting control devices and system components. Recommended schedule for inspection and recalibration of sensors.
2. Complete narrative describing intended operation and sequence for each control scenario and system component, updated to reflect all changes resulting from commissioning of systems. Narrative shall indicate recommended settings for devices where applicable.
3. Replacement part numbers for all system components.

B. Identify installed location and labeling for each luminaire controlled by automated lighting controls.

1.8 SYSTEM DESCRIPTION

A. Performance Statement: This specification section and the accompanying lighting design documents describe the minimum material quality, required features, and operational requirements of the lighting control system (LCS). These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the performance required of the system, as presented in these documents, the Contractor and system manufacturer/vendor are solely responsible for determining all equipment, wiring, and programming required for a complete and operational system.

B. Provide an integrated lighting controls system consisting of panels, power supplies, controllers, sensors, relays, switches, devices, wiring, etc. necessary to perform the Lighting Control Sequence of Operation as defined on the plans and specifications. Contractor is responsible for confirming that all components and luminaires interoperate as a single system.

1. Sequence of Operation: Describes the required operation and performance for lighting control in each space. Sequences of operation are indicated on the drawings.
2. Drawings: The drawings include sequences of operation, locations of control interface devices, sensors, and control zones. Wiring and additional equipment to make a complete and functioning system has not been shown, but shall be submitted with the shop drawings.

C. The following control types and features are acceptable. Acceptable control locations are shown on the drawings.

1. Line Voltage Control: Control equipment consists of traditional line voltage wiring devices and equipment such as switches, dimmers and combination occupancy/vacancy sensor switches, etc.

1.9 WARRANTY

A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two (2) years from date of commissioning.

B. Occupancy, vacancy, daylight sensors and controls shall have a five (5) year warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROLS

A. All items of material having a similar function (e.g., switches, dimmers, sensors, contactors, relays, etc.) shall be of the same manufacturer, unless specifically stated otherwise on drawings or elsewhere in the specifications. Lighting control switches, systems, and components shall be listed.

B. Color of lighting controls and sensors shall match the receptacle wiring devices specified in the space.

C. The functions described in the lighting sequence of operation shall dictate the actual lighting control device required to accomplish the functions described for the space.

2.2 DEVICE COLOR

A. All switch, lighting controls, and coverplate colors shall be the same as wiring devices, unless indicated otherwise.

2.3 COVERPLATES

A. All switches and lighting controls shall be complete with coverplates that match material and color of the wiring device coverplates in the space.

B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.

C. Install nameplate identification as indicated in Section 26 05 53.

D. Plate-securing screws shall be metal with head color matching the wall plate finish.

2.4 WALL SWITCHES

A. Refer to Electrical Symbols List for device type.

B. **SW-3W;** Three-way Switch:

1. 120/277 volt, 20 amp. Toggle handle, side and back wired.
2. Manufacturers:

    a. Hubbell 1223
    b. Leviton 1223-2
    c. Pass & Seymour PS20AC3
    d. Cooper AH1223

2.5 CONDUCTORS AND CABLES

A. Control Wiring:

1. Where installed with the line-voltage wiring, control wiring shall be copper conductors not smaller than No. 16 AWG with insulation voltage rating and temperature rating equal to that of the line-voltage wiring, complying with Division 26 Section 26 05 13 "Wire and Cable."
2. Tap conductors to switches or relays: Stranded copper conductors of 16 AWG or solid 16 or 18 AWG with insulation rating equal to that of the line-voltage wiring.
3. Tap conductors to dimming ballasts: Solid copper conductors of 18 AWG with insulation voltage rating equal to that of the line-voltage wiring and insulation temperature rating not less than 90°C.
4. Network cabling as required by manufacturer.

B. Splices and Taps:

1. Tapping or wire trap connectors shall be used to splice all Class 1 and Class 2 control wiring. Twist-on, wire-nut type connectors are not allowed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field dimensions and coordinate physical size of all equipment with the architectural requirements of the spaces into which they are to be installed. Allow space for adequate ventilation and circulation of air.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings.

B. All wiring shall be installed in conduit.

C. All branch load circuits shall be live tested before connecting the loads to the lighting control panel.

3.3 SUPPORT SERVICES

A. System Startup:

1. Manufacturer shall provide factory authorized technician to confirm proper installation and operation of all system components.

B. Testing:

1. System shall be completely functional tested by a factory-authorized technician. All loads shall be tested live for continuity and freedom from defects, and all control wiring shall be tested for continuity and connections prior to energizing the system components.

END OF SECTION 26 09 33

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SECTION 26 20 00 - SERVICE ENTRANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Arrangement with Utility Company for permanent electric service.

B. Underground service entrance

1.2 RELATED SECTIONS AND WORK

A. Refer to the Riser Diagram for additional information.

1.3 QUALITY ASSURANCE

A. Utility Company: Alliant Energy.

B. Install service entrance in accordance with Utility Company's rules and regulations.

1.4 SYSTEM DESCRIPTION

A. System Voltage: 208Y/120 volts, three phase, four-wire, 60 Hertz.

PART 2 - PRODUCTS

2.1 METERING EQUIPMENT

A. Meter: Furnished by the Utility Company.

B. Meter Base: Furnished by the Contractor, as approved by the Utility Company. (Manufacturers: Milbank, Superior, Duncan, or Anchor).

C. MC-1**;** Exterior Mounted Metering Cabinets: Furnished and installed by the Contractor to Utility Company's specifications. Conduit and conductors between metering cabinets and instrumentation shall be by the Contractor. Connections as required by the Utility Company.

2.2 IDENTIFICATION

A. Provide a permanent plaque or sign denoting all services, feeders, and branch circuits supplying the building or structure and the area served by each. Install plaque or sign at each service disconnecting means.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

B. Primary distribution equipment and pad-mounted transformers shall be furnished and installed by the Utility Company.

C. Primary conductors shall be furnished, installed, and terminated by the Utility Company. Primary conduit shall be furnished and installed by the Contractor, as shown on the drawings, to the Utility Company's requirements.

D. Underground: Install service entrance conduits in concrete envelope from Utility Company's pad mounted transformer to meter cabinet and building service entrance equipment. Utility Company will connect service conductors to transformer secondary lugs.

E. Concrete Pad for Transformer: Furnished and installed by the Contractor to Utility Company's specifications.

END OF SECTION 26 20 00

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lighting and appliance branch circuit panelboards: **Panel '###'**

1.2 RELATED SECTIONS AND WORK

A. Refer to the Electrical Distribution Diagram and Electrical Schedules for size, rating, and configuration.

1.3 REFERENCES

A. NEMA AB 1 - Molded Case Circuit Breakers

B. NEMA PB 1 - Panelboards

C. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less

D. UL 67 - Panelboards

1.4 SUBMITTALS

A. Submit shop drawings for equipment and component devices under provisions of Section 26 05 00.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Refurbished branch panel enclosure documentation for new branch panelboards installed in existing enclosures.

D. Submit manufacturer's instructions under provisions of Section 26 05 00.

1.5 SPARE PARTS

A. Keys: Furnish four (4) each to the Owner.

PART 2 - PRODUCTS

2.1 RATINGS

A. Definitions:

1. Series rated equipment shall be defined as equipment that can achieve a required UL AIC rating with an upstream device such as a main breaker or a combination of devices to meet or exceed a required UL AIC rating. All series rated equipment shall have a permanently attached nameplate indicating that device rating must be maintained. See Section 26 05 53 for additional requirements.
2. Fully rated equipment shall be defined as equipment where all devices in that equipment shall carry a minimum of the AIC rating that is specified.

B. The panelboards for this project shall be fully rated unless otherwise specifically noted in the Drawings or Specifications.

2.2 BRANCH CIRCUIT PANELBOARDS

A. General

1. Manufacturers:

a. Square D NQ, NF
b. ABB ReliaGear Series
c. Siemens P1
d. Eaton PRL1, PRL2

B. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.

C. Enclosure: NEMA PB 1; Type 1.

D. Provide cabinet front with door-in-door construction, concealed hinge, and flush lock all keyed alike. Door hardware shall provide swing clear operation (180-degree swing). Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, ratings as scheduled on the drawings. Provide copper ground bus in all panelboards.

F. All unlabeled circuits shown on the panelboard schedule shall be fully prepared spaces for future breakers.

G. All multiple-section panelboards shall have the same dimensional back box and cabinet front size.

H. Minimum Integrated Short Circuit Rating: As shown on the drawings.

I. Provide handle lock-on devices for all breakers serving exit sign and lighting circuits with emergency battery units. Provide handle lock-on devices and red handles for breakers serving fire alarm panels.

J. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on the drawings. Do not use tandem circuit breakers.

K. Suitable for use as service entrance equipment. Provide line side (service style) barriers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards plumb as indicated on the drawings in conformance with NEMA PB 1.1.

B. Height: 6 feet to handle of highest device.

C. Provide filler plates for unused spaces in panelboards.

D. Provide custom typed circuit directory for each branch circuit panelboard. Provide updated custom typed circuit directory for each existing branch circuit panelboard with new or revised circuits per the scope of work. Label shall include equipment name or final approved room name, room number, and load type for each circuit (examples: SUMP SP-1 or ROOM 101 RECEPT). Revise directory to reflect circuit changes required to balance phase loads. Printed copies of the bid document panel schedules are not acceptable as circuit directories.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION 26 24 16

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SECTION 26 24 19 - MOTOR CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual motor starters and switches

1.2 RELATED SECTIONS AND WORK

A. Refer to the Disconnect and Starter Schedule and One-Line Diagram for rating and configuration.

1.3 REFERENCES

A. ANSI/UL Standard 508. Standard for Industrial Control Equipment

B. FCC Rules and Regulations, Part 15, Subpart J- Radio Frequency Interference

C. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service

D. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses)

E. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted

F. NEMA AB 1 - Molded Case Circuit Breakers

G. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies

H. NEMA ICS 6 - Enclosures for Industrial Controls and Systems

I. NEMA KS 1 - Enclosed Switches

J. NEMA PB 1 - Panelboards

K. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00.

B. Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; wiring diagrams that differentiate between manufacturer-installed and field-installed wiring; nameplate legends; size and number of bus bars per phase, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.

C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and over-current protective devices.

D. Submit manufacturer's instructions under provisions of Section 26 05 00.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 26 05 00.

B. Deliver in 60-inch maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.

C. Store and protect products under provisions of Section 26 05 00.

D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from fumes, dirt, water, construction debris, traffic, and physical damage.

E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

PART 2 - PRODUCTS

2.1 MANUAL MOTOR STARTERS MS-# AND SWITCHES MX-#

A. Acceptable Manufacturers:

1. Square D 2500 Series
2. Eaton MS Series
3. ABB
4. Siemens SMF / MMS Series

B. Manual Motor Starter: NEMA ICS 2; AC general-purpose Class A manually operated non-reversing full-voltage controller for induction motors rated in horsepower, with overload relay, and toggle operator.

C. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, and toggle operator.

D. Motor Starting Switch: NEMA ICS 2; AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, and toggle operator.

E. Enclosure: NEMA ICS 6; Type 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fuses in fusible switches.

B. Select and install heater elements in motor starters to match installed motor characteristics.

C. Set field-adjustable switches and circuit-breaker trip ranges.

D. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION 26 24 19

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SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Device plates and box covers

B. Receptacles (REC-#)

1.2 QUALITY ASSURANCE

A. Provide similar devices from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Electrical Code, by a testing agency to Authorities Having Jurisdiction and marked for intended use.

C. Comply with the Electrical Code.

1.3 REFERENCES

A. DSCC W-C-896F - General Specification for Electrical Power Connector

B. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet

C. NEMA WD 1 - General Color Requirements for Wiring Devices

D. NEMA WD 6 - Wiring Devices - Dimensional Requirements

E. NFPA 70 - National Electrical Code (NEC)

F. UL 498 - Standard for Attachment Plugs and Receptacles

G. UL 943 - Standard for Ground Fault Circuit Interrupters

1.4 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

1.5 COORDINATION

A. Receptacles for Owner Furnished Equipment: Match plug configurations.

B. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 DEVICE COLOR

A. All switch, receptacle, and outlet colors shall be verified with Architect, unless indicated otherwise.

2.2 COVERPLATES

A. All switches, receptacles, and outlets shall be complete with the following:

1. #302 stainless steel coverplates in finished spaces where walls are finished.
2. #302 stainless steel coverplates in unfinished spaces for flush boxes.
3. Galvanized steel coverplates in unfinished spaces for surface mounted boxes.

B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.

C. Install nameplate identification as indicated in Section 26 05 53.

D. Plate securing screws shall be metal with head color matching the wall plate finish.

2.3 RECEPTACLES

A. Refer to Electrical Symbols List for device type.

B. REC-DUP: NEMA 5-20R Duplex Receptacle:

1. Standard Grade: 125-volt, 20 amp, 3-wire grounding type with impact resistant thermoplastic face and steel back strap.

a. Manufacturers:

1) Hubbell 5352A
2) Leviton, 5362-S
3) Pass & Seymour 5362
4) Cooper 5352

C. REC-DUP-GFI: NEMA 5-20R Ground Fault Duplex Receptacle:

1. Standard Grade: 125-volt, 20 amp, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face, listed.

a. Device shall perform self-test of GFCI circuitry in accordance with UL 943.
b. Manufacturers:

1) Hubbell GFCI type devices are not allowed. Contractor may substitute an alternative manufacturer when Hubbell is the basis of submittal for all other wiring devices.
2) Leviton GFNT2
3) Pass & Seymour 2097
4) Cooper SGF20

D. REC-QUAD: NEMA 5-20R Double Duplex Receptacle:

1. Consists of two duplex receptacles, double gang box, plaster ring and faceplate.

a. Manufacturers:

1) Refer to Duplex Receptacle above.

E. REC-QUAD-GFI: NEMA 5-20R Double Duplex GFI Receptacle:

1. Consists of two duplex GFI receptacles, double gang box, plaster ring and faceplate.

a. Manufacturers:

1) Refer to Duplex GFI Receptacle above.

F. Back wired devices shall be complete with eight holes that are screw activated with metal clamps for connection to #12 or #10 copper conductors.

G. Side wired devices shall have four binding screws that are undercut for positive wire retention.

H. Ground fault circuit interrupter (GFCI) receptacles shall be listed and comply with UL 943 requiring increased surge immunity, improved corrosion resistance, improved resistance to false tripping and diagnostic indication for miswiring if the line and load conductors are reversed during installation.

2.4 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded copper conductors, with Type SOW-A jacket; with green insulated grounding conductor and equipment rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection, FS/UL listed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install convenience receptacles at elevations indicated in the General Installation Notes on the contract drawings.

B. Install specific-use receptacles at heights shown on the contract drawings. Install devices level, plumb, and square with building lines. Coordinate installation of adjacent devices of separate systems with common mounting heights, including lighting, power, systems, technology, and temperature control device rough-ins.

C. Ground Fault Protection: Provide ground fault protection for all branch circuit breakers serving 120/208 receptacles and electrical outlets rated 50 amps or less single-phase and 100 amps or less three-phase in the following locations, as shown on drawings, or required by adopted code:

1. Bathrooms, locker rooms, shower rooms
2. Interior/Exterior locations subject to damp/wet conditions
3. When located within 6 feet of sinks, bathtubs, and shower stalls
4. Garages, accessory buildings, service bays

D. Install receptacles vertically with ground slot up or where indicated on the drawings, horizontally with ground slot to the left.

E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

F. Install devices and wall plates flush and level.

G. Install nameplate identification to receptacle cover plates indicated. Identification shall identify panel name and circuit number. Refer to Specification Section 26 05 53 - Electrical Identification.

H. Test receptacles for proper polarity, ground continuity and compliance with requirements.

END OF SECTION 26 27 26

SECTION 26 28 16 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fusible switches

B. Non-fusible switches

C. Enclosures

1.2 RELATED SECTIONS AND WORK

A. Refer to the Disconnect and Starter Schedule for rating and configuration.

1.3 REFERENCES

A. NEMA KS 1 - Enclosed Switches

1.4 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Product Data: For each type of enclosed switch, circuit breakers, accessory and component indicated, include dimensions, weights, and manufacturer's technical data on features, performance, and ratings.

C. Electrical Characteristics: For each type of enclosed switch, enclosure types, current and voltage ratings, short-circuit current ratings, UL listing for series rating of installed devices, features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.5 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE AND NON-FUSIBLE SWITCHES

A. Acceptable Manufacturers:

1. Square D 3110 Series
2. Eaton DH Series

3. ABB TH Series
4. Siemens HNF / HF Series

B. FDS-#; Fusible Switch Assemblies: NEMA KS 1; Type heavy duty, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position without a tool. Handle lockable in OFF position. Fuse Clips: Class 'R' fuse clips only, unless indicated otherwise on the drawings.

C. DS-#; Non-fusible Switch Assemblies: NEMA KS 1; Type heavy duty, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position without a tool. Handle lockable in OFF position.

D. Enclosures: Type as indicated on the disconnect schedule.

E. Accessories: Provide the following accessories. Refer to Disconnect Schedule for additional requirements for each application.

1. Lockable
2. Provide finger safe barriers for exposed line-side terminations and energized components when the switch is in the open position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on the drawings.

B. Install fuses in fusible disconnect switches.

C. Field coordinate installation with other contractors and equipment to maintain code required working space requirements.

D. Provide adhesive label on inside door of each switch indicating UL fuse class and size for replacement.

END OF SECTION 26 28 16

SECTION 26 51 19 - LED LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires and accessories

B. Light-emitting diode (LED) luminaire systems

C. Emergency exit signs

1.2 RELATED SECTIONS

A. The lighting system design includes a combination of luminaire sources, lighting control components, programming sequences, and supplementary components for building and energy code compliance. The design uses performance-based specifications for portions of the lighting system to account for the limitation of comparable product solutions available by competitive manufacturers. The Contractor shall reference related specification sections, plans, schedules, and details prior to submitting pricing, submittals, and installation. The Contractor shall coordinate system component compatibility among various manufacturers and suppliers for a turnkey lighting system. Referenced sections include, but are not limited to, the following:

1. 26 09 33 Lighting Control Systems
2. Electrical drawings: Plans, luminaire schedules, lighting control sequence of operations, diagrams, and details.

1.3 REFERENCES

A. ANSI C78.377 - Specifications for the Chromaticity of Solid State Lighting Products

B. ANSI C82.16 - Light-Emitting Diode Drivers - Method of Measurement

C. ANSI C82.77 - Standard for Harmonic Emission Limits and Related Power Quality Requirements for Lighting Equipment

D. NFPA 70E - National Electrical Safety Code

E. NEMA SSL1 - Electronic Drivers for LED Devices, Arrays or System

F. UL 8750 - Light Emitting Diode (LED) Equipment for use in Lighting Products

G. LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

H. LM-80 - Measuring Luminous Flux and Color Maintenance of LED

I. FS W-L-305 - Light Set, General Illumination (Emergency or Auxiliary)

J. UL 924 - Standard for Emergency Lighting and Power Equipment

1.4 SUBMITTALS

A. Submit product data under provisions of Section 26 05 00.

B. Basic Requirements of Submittal:

1. Submit product data sheets for luminaires, LED light engines, drivers and poles. Include complete product model number with all options as specified. Submittal shall be arranged with luminaires listed in ascending order, and with each luminaire's, LED light engine, driver, or pole information following luminaire's product data. Failure to organize submittal in this manner will result in the submittal being rejected.
2. Submit lens product data, dimensions and weights if not included in product data sheet submittal.
3. Include outline drawings, support points, weights, and accessory information for each luminaire.
4. Submit manufacturer origin of LED chipset and driver.

C. LED Lighting - Performance Testing Submittal (when requested by Architect/Engineer):

1. IESNA LM-79: Include photometric report for the latest generation system being furnished. Provide name of independent testing laboratory, report number, date of test, luminaire series/model number, input wattage, and light source specifications.
2. IESNA LM-80: Measuring Lumen Maintenance of LED Light Sources.

D. LED Lighting - Control Compatibility Submittal:

1. Submit lighting control capability data for each LED luminaire. The submittal shall clearly identify device data proposed by the Contractor and approved by the luminaire manufacturer for dimming, switching, addressable, wireless, and similar control characteristics.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site. Store and protect under provisions of Section 26 05 00.

B. Protect luminaire finishes, lenses, and trims from damage during storage and installation. Do not remove protective films until construction cleanup within each area is complete.

1.6 WARRANTY

A. The warranty period begins at the date of Substantial Completion.

B. LED Light Engines and Drivers:

1. LED Drivers and Dimming Drivers: Five (5) years
2. Light Emitting Diode (LED) Light Engines: Five (5) years

C. Emergency Lighting Units and Exit Signs:

1. Exit Signs: Three (3) year, non-prorated
2. Emergency Unit and Exit Sign Battery: Sealed lead acid or lead calcium cell, requiring no maintenance or replacement for ten (10) years under normal conditions.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES - GENERAL

A. Lensed Troffers: Provide hinged frames with latches and 0.125-inch thick virgin acrylic lenses. Prismatic lenses shall have depth of no less than 0.080", KSH12 or equal. Other lenses as scheduled.

B. Luminaires: Louvers shall be anodized low iridescent specular aluminum with mitered corners and interlocking construction.

C. Suspended Luminaires: Coordinate power feed and suspension canopies with ceiling type and architectural RCP for proper fit and location. Ensure finished installations are plumb and level at elevations specified. Verify suspension length prior to submittal.

D. Painted reflector surfaces shall have a minimum reflectance of 90%.

2.2 LIGHT EMITTING DIODE (LED) LUMINAIRE SYSTEMS

A. Refer to the luminaire schedule for color temperature and minimum color rendering index CRI requirements. Provide light source color consistency by utilizing a binning tolerance within a maximum 3-step McAdam ellipse unless noted otherwise.

B. LED chip arrays specified as color changing shall have chip colors as noted on the luminaire schedule.

C. Rated life shall be minimum of 50,000 hours at L70.

D. LED chips shall be wired so that failure of one chip does not prohibit operation of the remainder of the chip array.

E. Luminaire delivered lumens is defined as the absolute lumens per the manufacturers LM-79-08 test report.

F. LED luminaires shall be designed for ease of component replacement including modular replaceable boards or Zhaga sockets. Luminaires that are factory sealed and do not have field replaceable parts shall provide a 10-year warranty.

G. LED light engine shall have a maximum LLD of 0.85 at 50,000 hours at 25°C ambient.

H. LED Driver:

1. Solid state driver with integral heat sink. Driver shall have over-heat, short-circuit and overload protection, power factor 0.90 or above and maximum total harmonic distortion of 20%. Driver shall have a voltage fluctuation tolerance of +/- 10%.
2. Drivers shall have dimming capabilities as outlined in the luminaire schedule for each luminaire type. Dimming shall control light output in a continuous curve from 100% to 10% unless noted otherwise.
3. Driver shall have a minimum of 50,000 hours rated life.
4. Driver shall be tested to ANSI C82-16 for input current inrush, total harmonic distortion (THD), and power factor. Driver start time shall be less than 0.5 seconds to 98% of initial light output. Flicker should be less than 30% throughout the operating range.
5. Driver shall be field replaceable without removal of the luminaire.
6. Class A sound rating; inaudible in a 27 dBA ambient.

7. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.

2.3 EMERGENCY EXIT SIGNS

A. Self-Powered Exit Signs: Stencil face, 6-inch high letters, directional arrows as indicated, universal mounting type as indicated on the drawings. One-piece, self-contained unit with sealed, maintenance-free nickel cadmium battery, test switch, AC ON pilot light, automatic charger, and electronic circuitry. Power failure relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

B. Directional Indicators: The directional indicator for exit signage shall be of a chevron type meeting all requirements of NFPA 101.

C. Self-Diagnostics and Testing:

1. Unit shall be self-diagnostic with continuous monitoring of charger performance and battery voltage. Any malfunction of battery, charger, transfer circuit, or emergency lamps shall be detected and visually indicated.
2. Unit shall be programmed to exercise the battery and test emergency operation by performing a five-minute discharge/diagnostic cycle every six months. A manual test switch shall allow a five minute discharge/diagnostic test at any time.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Securely fasten luminaires to the listed and labeled ceiling framing member by mechanical means such as bolts, screws, rivets or listed clips identified for use with the type of ceiling framing members. The architectural ceiling framing system may be used in lieu of independent support with prior written approval by the ceiling system manufacturer and Authority Having Jurisdiction (AHJ). Luminaires and wiring installed in fire-rated ceiling assemblies shall be independently supported for all applications.

B. Do not fasten luminaire supports to piping, ductwork, mechanical equipment, or conduit, unless otherwise noted. Support wires shall be tightly wrapped (minimum of three turns within 3 inches of the connection) and sharply bend to prevent vertical movement.

C. Support suspended or pendant mounted luminaires independent of ceiling grid with adjustable stainless steel aircraft cables or per luminaire schedule mounting requirements. Suspension assembly and anchors shall be capable of supporting 300 pounds dead load at each suspension point.

D. Support wire used to independently support luminaires, raceways, and wiring systems shall be distinguishable from ceiling support systems by color (field paint), tagging or equivalent means.

E. Adjust aimable luminaires to obtain lighting levels on objects and areas as directed to obtain desired lighting levels.

3.2 CONSTRUCTION USE OF PROJECT LUMINAIRES

A. The Contractor shall provide temporary construction lighting per the requirements of Division 1.

B. The project luminaires shown on the construction documents shall not be used for temporary construction purposes without providing a plan for Owner approval that addresses energy and luminaire operating hours.

3.3 EMERGENCY LIGHTING UNITS AND EXIT SIGNS

A. Install units plumb and level.

B. Aim directional lamp heads as directed.

C. Test emergency lighting equipment for 60 minutes to determine proper operation, prior to Substantial Completion. Provide electronic copy of periodic test log form to Owner's Representative. Explain and instruct Owner's Representative of requirements for testing and maintenance. Refer to latest adopted NFPA 101 for testing and logging requirements.

3.4 RELAMPING

A. Replace failed LED light engine modules or arrays at completion of work.

3.5 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.

3.6 OWNER TRAINING

A. Test emergency lighting equipment for 60 minutes to determine proper operation, prior to Substantial Completion, with the Owner's Representative.

B. Provide electronic copy of periodic test log form to Owner's Representative. Explain and instruct Owner's Representative of requirements for testing and maintenance. Refer to latest adopted NFPA 101 for testing and logging requirements.

3.7 LUMINAIRE SCHEDULE

A. As shown on the drawings.

END OF SECTION 26 51 19

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SECTION 28 31 00 - FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire alarm and detection systems.

1.2 RELATED WORK

A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in smoke detection and fire alarm systems with ten years' experience.

B. Installer: A factory-authorized Electrical or Security Contractor licensed with the State and local jurisdiction with five years' experience in the design, installation, and maintenance of fire alarm systems by that manufacturer.

C. Qualifications: The person managing/overseeing the preparation of shop drawings and the system installation/programming/testing shall be trained and certified by the system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 2. This person's name and certification number shall appear on the start-up and testing reports.

1.4 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

B. NFPA 72 - National Fire Alarm and Signaling Code

C. NFPA 101 - Life Safety Code

D. UL 2017 - General Purpose Signaling Devices and Systems

E. UL 217 / 268 - Standard for Smoke Alarms / Smoke Detectors for Fire Alarm Systems

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00 and as noted below.

1. Failure to comply with all the following and all the provisions in 26 05 00 will result in the shop drawing submittal being rejected without review.
2. Failure to submit the fire alarm without all requirements fulfilled in a single comprehensive submittal will be grounds to require a complete resubmittal.

B. Provide product catalog data sheets as shop drawings.

1. Provide a product catalog data sheet for each item shown on the Electrical Symbols List and for each piece of equipment that is not shown on the drawings, but required for the operation of the system.
2. Where a particular Electrical Symbols List item has one or more variations (such as those denoted by subscripts, etc.) a separate additional product catalog data sheet shall be provided for each variation that requires a different part number to be ordered. The corresponding Electrical Symbols List symbol shall be shown on the top of each sheet.
3. Where multiple items and options are shown on one data sheet, the part number and options of the item to be used shall be clearly denoted.

C. Submit CAD Floor Plans as Shop Drawings:

1. The complete layout of the entire system, device addresses, auxiliary equipment, and manufacturer's wiring requirements shall be shown.
2. A legend or key shall be provided to show which symbols shown on the submittal floor plans correspond with symbols shown on the Contract Documents.

D. Provide installation and maintenance manuals under provisions of Section 26 05 00.

E. Submit manufacturer's certificate that system meets or exceeds specified requirements.

F. Submit photocopy proof of NICET certification of the person overseeing the preparation of drawings and installation/testing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 26 05 00.

B. Store and protect products under provisions of Section 26 05 00.

1.7 REGULATORY REQUIREMENTS

A. System: UL or FM Global listed.

B. Conform to requirements of NFPA 101.

C. Conform to requirements of Americans with Disabilities Act (ADA).

D. Conform to UL 864 Fire Alarm, UL 1076 Security, UL2017 General Signaling.

1.8 SYSTEM DESCRIPTION

A. Performance Statement: This specification section and the accompanying fire alarm specific design documents describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

B. This section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices, control panels, auxiliary control devices, annunciators, power supplies, and wiring as indicated on the drawings and specified herein.

C. Extending the Existing Fire Alarm System: Provide all items, components, devices, hardware, software, programming, expansion components, conduit, wiring etc. needed to extend the existing fire alarm system. This includes, but is not limited to, additional power supplies, initiating devices and circuits, signaling devices and circuits, monitoring devices and circuits, auxiliary control and related devices such as, door holders and their control, smoke damper control, fan shutdown, etc. The existing fire alarm system shall be extended such that the existing fire alarm system's functionality, integrity and annunciation shall be equivalent to pre-construction conditions, unless noted otherwise. The functionality and integrity shall be maintained during construction. The entire system shall be able to be completely reset from any single reset location point. The entire system shall be annunciated at any annunciation location.

D. Extending the Existing Fire Alarm System: The existing control panel shall remain and shall be operational throughout construction. The system shall only be disabled to make new connections and to modify the programming. A fire watch shall be provided for all areas affected during outages. All system outages must be scheduled with the Owner at least one week prior. Individual devices may be disabled as needed based on construction activities to reduce the potential for false alarms, but all devices must be operational when the Contractor is not physically on site. New initiating devices may be connected to the existing signaling line circuits where capacity is available. Provide additional signaling line circuits as needed based on existing and new device quantity, including replacement of existing panel components. Provide new notification circuits to serve the new devices, including all necessary power supplies, amplifiers, batteries, and 120-volt input circuits. All new devices shall be programmed to provide the same sequence of operation as the existing devices of the same type, unless noted otherwise.

E. Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 26 05 00.

B. Include location of end-of-line devices.

C. Provide a CAD drawing of each area of the building (minimum scale of 1/16" = 1'-0") showing each device on the project and its address. The devices shall be shown in their installed location and shall be labeled with the same nomenclature as is used in the fire alarm panel programming.

D. Submit test results of sound pressure level (dBA) and intelligibility (STI) with the rooms tested designated on the floor plan. Notification devices shall have the tap wattage designated.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 26 05 00.

B. Include operating instructions, and maintenance and repair procedures.

C. Include results of testing of all devices and functions.

D. Include manufacturer's representative's letter stating that system is operational.

E. Include the CAD floor plan drawings.

F. Include shop drawings as reviewed by the Architect/Engineer and the local Authority Having Jurisdiction.

1.11 WARRANTY

A. Provide one (1) year warranty on all materials and labor from Date of Substantial Completion.

B. Warranty requirements shall include furnishing and installing all software upgrades issued by the manufacturer during the one (1) year warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Match existing manufacturer.

2.2 FIRE ALARM PATHWAY CLASS AND SURVIVABILITY LEVEL

A. Pathway Class:

1. Pathway Class B: Circuits NOT capable of transmitting an alarm beyond the location of the fault condition. Wiring of outgoing and return conductors is permitted to be run in the same conduit or cable.

B. Pathway Survivability Level:

1. Pathway Survivability Level 0: Circuits have no requirements for pathway survivability beyond the requirements of the code.
2. Shared Pathway Designation Level 1: Physical segregation of life safety and non-life safety data is not required. Life safety data shall be the priority.

2.3 SIGNALING LINE CIRCUIT DEVICES

A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.

B. Signal Line Device(s):

1. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

a. Device type as follows:

1) Candela Ratings:

a) ## = 15 Candela, 30 Candela; 75 Candela; 110 Candela; 177 Candela

C. FA-130; Manual Pull Stations:

1. Manual pull station, addressable, double action with plastic breakrod, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering. Provided with all necessary mounting hardware. Use surface mount only on precast concrete or structure.
2. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.
3. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location, with maintained temperatures between 32°F and 120°F.

2.4 NOTIFICATION APPLIANCE DEVICES

A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.

B. Notification Appliance Device(s):

1. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.

a. Device types as follows:

1) Candela Ratings:

a) ## = 15 Candela; 30 Candela; 75 Candela; 110 Candela; 177 Candela

C. Notification Device(s):

1. Wall Mounted: White housing with red lettering or pictogram.

D. FA-200; Visual Alarm Devices:

1. Wall or ceiling mounted, refer to plans.
2. High intensity (Candela rating as scheduled on the drawings) xenon strobe or equivalent under a lens. Candela rating shall be visible from exterior of the device.
3. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.
4. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.

5. (W) Weatherproof Visual Notification Device: High intensity strobe, square housing, 75 Candela rating, suitable for wet locations. Provide with weatherproof back box.

    a. Mounting: Semi-flush wall.
    b. Conduit shall not be exposed.

E. FA-210; Audio Horn Alarm Devices:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
2. Wall or ceiling mounted, refer to plans.
3. Sound Rating: 85 dB at 10 feet. Sound levels for alarm signals shall not exceed 120 dBA in the occupied area.
4. Device shall be capable of a high and low dB level setting. Unless noted otherwise, the device shall be set to the high setting at building completion.
5. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.

F. FA-211; Combination Audio Horn and Visual Alarm Device:

1. Wall or ceiling mounted, refer to plans.
2. Combine audio and visual components into a single device. Refer to the corresponding paragraphs above for requirements of each component.
3. (W) Weatherproof Audio/Visual Notification Device: Electronic horn with high intensity strobe, square housing, 75 Candela, suitable for wet locations. Provide with weatherproof back box.

    a. Mounting: Semi-flush wall.
    b. Conduit shall not be exposed.

2.5 WIRING

A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes. Cabling shall be UL listed and labeled as complying with the Electrical Code for power-limited fire alarm signal service.

B. Fire Alarm Cable:

1. Manufacturers:

    a. Comtran Corp.
    b. Helix/HiTemp Cables, Inc.
    c. Rockbestos-Suprenant Cable Corp.
    d. West Penn Wire/CDT.
    e. Radix.

PART 3 - EXECUTION

3.1 SEQUENCES OF FIRE ALARM OPERATION

A. General:

1. Refer to the Fire Alarm Operation Matrix on the drawings for basic requirements and system operation.
2. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

B. Audible Alarms Sequence:

1. Audible alarms throughout the building shall sound.

C. Visual Alarms Sequence:

1. Visual alarms throughout the building shall flash.

3.2 INSTALLATION

A. Install system in accordance with manufacturer's instructions and referenced codes.

B. Devices:

1. General:

a. All ceiling-mounted devices shall be located where shown on the reflected ceiling and floor plans. If not shown on the reflected ceiling or reflected floor drawings, the devices shall be installed in the relative locations shown on the floor drawings in a neat and uniform pattern.
b. All devices shall be coordinated with luminaires, diffusers, sprinkler heads, piping and other obstructions to maintain a neat and operable installation. Mounting locations and spacing shall not exceed the requirements of NFPA 72.
c. Where the devices are to be installed in a grid type ceiling system, the detectors shall be centered in the ceiling tile.
d. The location of all fire alarm devices shall be coordinated with other devices mounted in the proximity. Where a conflict arises with other items or with architectural elements that will not allow the device to be mounted at the location or height shown, the Contractor shall adjust location of device so that new location meets all requirements in NFPA 72 and all applicable building codes.

2. Per the requirements of NFPA, detector heads shall not be installed until after the final construction cleaning unless required by the local Authority Having Jurisdiction (AHJ). If detector heads must be installed prior to final cleaning (for partial occupancy, to monitor finished areas or as otherwise required by the AHJ), they shall not be installed until after the fire alarm panel is installed, with wires terminated, ready for operation. Any detector head installed prior to the final construction cleaning shall be removed and cleaned prior to closeout.
3. Manual Pull Stations:

a. Stations shall be located where shown and at the height noted on the drawings.

4. Notification Appliance Devices:

    a. Devices shall be located where shown on the drawings.
    b. Wall-mounted audio, visual and audio/visual alarm devices shall be mounted as denoted on the drawings.

C. Wiring:

1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes.
2. Wiring shall be installed in conduit.
3. All junction boxes with SLC and NAC circuits shall be identified on cover.
4. Fire Alarm Power Branch Circuits: Building wiring as specified in Section 26 05 13.
5. Notification Appliance Circuits shall provide the features listed below. These requirements may require separate circuits for visual and audible devices.

    a. Fire alarm temporal audible notification for all audio appliances.
    b. Synchronization of all visual devices where two or more devices are visible from the same location.
    c. Ability to silence audible alarm while maintaining visual device operation.

6. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be in fire alarm conduits. Wiring splices shall be avoided to the extent possible, and if needed, they shall be made only in junction boxes, and enclosed by plastic wire nut type connectors. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one wire shall be labeled on each end, in all junction boxes, and at each device with "E-Z Markers" or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded, and no unterminated conductors are permitted in cabinets or control panels. All controls, function switches, etc. shall be clearly labeled on all equipment panels.

D. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color coding as follows, or using colored tape at each conductor termination and in each junction box.

1. Power Branch Circuit Conductors: In accordance with Section 26 05 53.
2. Signaling Line Circuit: Overall red jacket with black and red conductors.
3. DC Power Supply Circuit: Overall red jacket with violet and brown conductors.
4. Notification Appliance Circuit: Overall red jacket with blue and white conductors.
5. Central Station Trip Circuit: Orange conductors.
6. Central Station Fire Alarm Loop: Black and white conductors.

E. Devices surface mounted in finished areas shall be mounted on surface backboxes furnished by fire alarm equipment supplier. Backboxes shall be painted to match device, shall be the same shape and size as the device shall not have visible knockouts.

F. Make conduit and wiring connections to door release devices, sprinkler flow and pressure switches, sprinkler valve monitor switches, fire suppression system control panels, duct analog smoke detectors and all other system devices shown or noted on the Contract Documents or required in the manufacturer's product data and shop drawings.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 00.

B. Test in accordance with NFPA 72, Chapter 14 and local fire department requirements. Submit documentation with O & M manuals in accordance with Section 14.6 of the Code.

C. Contractor shall test and adjust the fire alarm system as follows:

1. Speaker taps shall be adjusted to the lowest tap setting which achieves a sound level higher than or equal to the greatest of the following:

    a. 70dBA.
    b. 15 dBA above ambient levels as indicated in NFPA 72 Table A.18.4.3.
    c. 15 dBA above measured ambient. 5 dBA above the maximum measured sound level with duration of more than 60 seconds.
    d. As specified on the drawings.

2. Sound level measurement procedure shall meet the following requirements:

    a. All measurements shall use the 'A' weighted, dBA, sound measurement scale.
    b. All measurements shall be taken after furnishings, wall coverings and floor coverings are in place.
    c. All measurements shall be taken after fixed equipment (HVAC units, etc.) producing ambient noise is installed and is in operation.
    d. All sound level measurements shall be taken at a height of 5' above the finished floor level.
    e. Measurements shall be taken in every unique room. If there are multiple rooms, which have the identical dimensions and function, 10%, or a minimum of two (2) rooms shall be tested. The results from the rooms tested shall be averaged and the remaining rooms may be adjusted per the average.
    f. Measurements shall be taken on a 20' x 20' grid and the results for all points taken shall be averaged. If the room is smaller than 20' x 20' a minimum of two measurements are required.
    g. Measurements shall be taken halfway between speakers or halfway between a speaker and the wall. No measurements shall be taken at the extreme edges of the room, nor directly under speakers.

3.4 MANUFACTURER'S FIELD SERVICES

A. Provide manufacturer's field services under provisions of Section 26 05 00.

B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

C. Note that room numbers depicted on the architectural/engineering drawings will not necessarily reflect the actual room (signage) numbers that the Owner selects. Contractor and fire alarm manufacturer shall coordinate the actual room numbers as the Owner directs to identify each device. This list shall be a part of the floor plan record drawing to be turned in at the project closeout.

END OF SECTION 28 31 00

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SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. The work covered by this Section includes preparing the site for construction, removal of revetment, clearing and grubbing, stripping and stockpiling topsoil, fence removal, removal of existing pavement markings, and erosion control.

B. The locations, profiles, dimensions, grades, and other details of the proposed improvements shall be as shown on the drawings.

C. Prior to beginning ground-disturbing activities, the project area shall be protected with filter socks as shown on the drawings and as described herein.

1.2 DEFINITIONS

A. Topsoil: Top layer of the soil profile consists of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, toxic materials, or other non-soil materials.

1.3 SUBMITTALS

A. Shop Drawings: none required.

B. Product Data:

1. Material Certifications: none required.
2. Catalog Information:
    a. Filter socks.

1.4 CONSTRUCTION WASTE DISPOSAL

A. Construction waste material shall be disposed of as described in Section 01 74 19 and as modified herein.

B. This Section includes the removal and disposal of several in-situ materials, including waste topsoil, cleared and grubbed vegetation, waste soil, waste granular surfacing, and existing concrete pavement. The removal and classification of these materials are outlined herein.

1. If there is surplus topsoil, it shall be removed from the project site. Enough topsoil shall be stockpiled for reuse as topsoil onsite at the thickness specified in Section 31 20 00.
2. Cleared and grubbed vegetation shall be chipped and used as erosion control mulch onsite or hauled from the site for use as mulch. Cleared and grubbed material shall not be burned or buried onsite.
3. Waste soil excavated from the proposed parking lot areas and entrances shall be hauled from the site and properly disposed.
4. Existing concrete pavement shall be hauled from the site.

C. So long as they do not end up in a landfill, all the above-listed waste materials shall be considered “diverted” from a landfill under the requirements of the waste management plan in Section 01 74 19.

D. All of the above-described materials shall be disposed of, to some degree, at an offsite location. The Contractor shall be responsible for locating suitable locations for wasting the material. It shall be the Contractor’s responsibility to ensure the areas (including haul roads) do not impact the following:

1. Culturally sensitive sites or graves.

2. Wetlands or 'waters of the U.S.' including streams and streambanks below the ordinary high water mark without approved U.S. Army Corps of Engineer's Section 404 Permit.
3. Endangered species.

E. No waste fill shall be placed within Ottumwa city limits without a current fill permit on file with the City. Fill permits may be obtained at City Hall (641-683-0606).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil shall be an in-situ material rich in humus as described in Section 31 10 00(1.2)A.

B. Temporary seed and mulch for erosion control shall be as described in Section 32 90 00.

C. 12-inch filter socks shall meet the requirements of Iowa DOT Section 4169.12.

PART 3 - EXECUTION

3.1 PREPARATION

A. Except as described in this Section, the Contractor shall protect and maintain benchmarks, survey control points, and existing property pins from disturbance during construction. If any of the above need to be disturbed, the Contractor shall survey the location of the point so it may be restored after construction.

B. The Contractor shall locate and clearly flag trees and vegetation to remain and protect existing site improvements to remain from damage during construction. Any damaged improvements shall be restored to their original condition as approved by the Owner.

3.2 EROSION CONTROL

A. Erosion control shall be as shown on the drawings and as described herein. Temporary seeding and erosion control mulching shall be as described in Section 32 90 00.

B. Filter socks shall be installed on the project site as appropriate to coordinate with the various stages of construction. Filter socks shown on the drawings establish an estimate of the quantity that will be required. The Contractor shall install filter socks in locations that will provide the greatest potential for preventing sediment runoff.

C. The filter socks shall be removed when the Owner agrees that permanent seeding is established. Depending on the condition of the filter sock, removal could include the complete removal of the sock and stakes or simply cutting the netting and spreading the filter material onsite.

D. Filter socks shall be furnished and installed in the locations shown on the drawings and as shown on Iowa DOT Standard Road Plan EC-204.

3.3 CLEARING AND GRUBBING

A. The clearing and grubbing shall include all labor and equipment required to clear, grub, remove, and dispose of the material from the project site. Clearing and grubbing shall be limited to the trees or areas as shown on the drawings. All other vegetation shall be preserved.

B. Trees larger than 3 inches in diameter may only be cleared between October 1 and March 31.

C. Within the clearing limits, the Contractor shall remove trees and stumps, including roots. The Contractor shall also remove logs and downed timber, hedge rows, brush, vegetation, rubbish, and other objectionable materials.

D. Stumps shall be grubbed to a depth of two feet below the proposed subgrade or existing grade, whichever is deeper. The cavity left by removed stumps shall be backfilled with native soil and compacted to the same level as adjacent soil.

E. The emerald ash borer is present in Wapello County. All ash trees within the clearing limits shall be considered infected and disposed of according to the Iowa Department of Agriculture and Land Stewardship's (IDALS) requirements. For more information, refer to: http://iowatreepests.com/eab_home.html.

3.4 TOPSOIL STRIPPING

A. Prior to beginning earthwork construction, the area shall be stripped of topsoil as described in Iowa DOT Section 2105.

B. The Contractor shall stockpile and salvage a sufficient quantity of topsoil such that a 6-inch minimum thickness of topsoil can be spread over the remaining grassed areas. Topsoil spreading shall be as described in Section 31 20 00.

C. Stockpiled topsoil to be spread over the finished site shall be segregated from other soil and material onsite. Topsoil containing clay, gravel, trash, debris, weeds, roots, or other waste material shall not be spread over the finished site.

3.5 PAVEMENT REMOVAL

A. This Section includes the removal of the existing pavement and concrete splash blocks as shown in the drawings.

B. When it is necessary to remove existing pavement, saw cuts shall be made 2 feet on each side of the proposed trench or to an existing pavement joint.

C. The Contractor shall position saw cuts so all existing pavement, which will remain in place, shall have a width of at least 3 feet. Curb and gutter sections shall be at least 30 inches wide. The saw cuts shall be 10-inch maximum depth or full depth, whichever is less.

D. Concrete damaged beyond the designated limits shall be replaced at the Contractor's expense. Removed pavement shall be crushed and used for granular material onsite or disposed of off the project site by the Contractor in an acceptable manner.

3.6 MISCELLANEOUS REMOVALS

A. Several sections of the existing chain link fence shall be removed and salvaged for construction. The areas to be removed and salvaged are shown on the drawings.

B. The fence fabric to be removed shall be cut neatly so the remaining fence has a pleasing appearance and remains functional. Fence posts to be removed shall be excavated and completely removed. Cutting off fence posts at the surface and leaving footings in the ground is not acceptable. The removed fence posts shall be removed from the site and properly disposed. The fence post holes shall be backfilled and compacted with topsoil within the same day the posts are removed. The removed fence fabric shall be salvaged and reinstalled as shown in the drawings.

C. Existing pavement markings shall be removed as shown on the drawings and as described herein. The marking removal shall be in accordance with Iowa DOT Section 2527.03(C). Covering up existing markings as described in Iowa DOT Section 2527.03(c)7 is not permitted.

3.7 TEMPORARY FENCING

A. Temporary safety fencing shall be installed in the locations as directed by the Owner and as described in Iowa DOT Section 2528.03(N).

B. The fencing shall be installed prior to the removal of the existing chain link fence and shall remain in place until the new chain link fence is installed.

C. If the temporary fence inhibits the work, it may be removed during working hours but shall be reinstalled during non-working hours.

END OF SECTION

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SECTION 31 20 00

EARTHMOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes excavation and grading subgrades for the paving improvements. The excavation and grading shall be completed as shown on the drawings and as described herein.

B. The approximate locations, profiles, dimensions, grades, and other details of the grading are shown on the drawings.

C. Prior to beginning the grading, topsoil shall be stripped from the site, existing granular surfacing removed, and erosion control installed as described in Section 31 10 00.

1.2 SUBMITTALS

A. Shop Drawings: none required.

B. Product Data:

1. Material Certifications:

a. Granular foundation material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Granular material for foundation stabilization shall be special backfill as described in Iowa DOT Section 4132.

PART 3 - EXECUTION

3.1 LOCATING TILE LINES

A. Existing unknown tile lines are not anticipated to be encountered with the construction. Except for tile lines shown to be removed or relocated on the drawings, repair or relocation of encountered tile lines shall be considered extra work and paid via change order.

B. The Contractor shall maintain a clear, legible record of the location of any existing drains or other underground property encountered in the excavation and trenching operation. This record shall indicate both the horizontal and vertical location in relation to the proposed improvements and shall note any changes or repairs that were made. At the end of the project, these records shall be given to the Owner.

3.2 FOUNDATION STABILIZATION

A. During construction, soft, unstable foundation areas may be identified by the earthmoving equipment. The Contractor shall notify the Owner of any areas of unstable foundation.

B. With concurrence from the Owner, the soft foundation material shall be removed and replaced with special backfill material. The special backfill material shall be as described in Section 31 20 00(2.1).

C. The special backfill material shall be placed in 6-inch maximum lifts and compacted with at least three passes of a smooth vibratory roller meeting the requirements of Iowa DOT Section 2001.05 after each lift.

D. Payment for excavation of unsuitable subgrade material and placing salvaged granular material or special backfill shall be made by change order.

3.3 CLASS 10 EXCAVATION

A. Excavation for the proposed parking area and entrances shall be as shown on the drawings and in accordance with Iowa DOT Section 2102.

B. Computation of the excavated volume has been determined as follows:

1. Parking area and entrances: Existing ground line used for the upper limit and the top of the subgrade (bottom of modified subbase) used for the lower limit.

C. Excavated material shall be used for fill. A shrinkage factor of 25% has been assumed for placed and compacted fill material. The cost for placing and compacting fill material and hauling any waste material offsite shall be included in the contract lump sum price. There will not be compensation for overhaul.

D. The quantities of excavation are as follows:

The total quantity of on-site Class 10 excavation is 498 C.Y. This excavation quantity only includes excavation necessary for grading. Material excavated from pipe trenches is not included in this quantity. The site grading generates 498 C.Y. of waste, plus whatever material is excavated from the pipe trenches backfilled with granular material.

E. The waste material shall be removed from the site. The Contractor shall be responsible for locating suitable locations for wasting excess material offsite in accordance with Section 31 10 00.

3.4 EMBANKMENT

A. Embankment at each location shall be started at the lowest elevation and brought up in horizontal lifts not exceeding 8 inches in loose thickness. The embankment shall be placed in accordance with Iowa DOT Section 2107.03(D).

B. Type A Compaction, as described in Iowa DOT Section 2107.03(E) shall be required for embankment placement.

3.5 SUBGRADE PREPARATION

A. Prior to placing the granular subbase or pavement, the subgrade shall be prepared in accordance with Iowa DOT Section 2109.03(B). The subgrade material shall be within the range of -1% to +4% of the soil's optimal moisture and be compacted to at least 95% of the Standard Proctor Density in accordance with the recommendations in the Geotechnical Exploration Report. At least four density tests shall be taken and evenly distributed such that each area to be paved receives at least one test. The Owner will hire an independent testing lab to conduct the density testing.

B. After preparation, the subgrade below the pavement shall be proof-rolled. The proof-roll shall be performed with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding, rutting, and/or pumping. Do not proof-roll wet or saturated subgrades. The proof rolling shall be as described below. The proof roll shall be performed in the presence of the Civil Engineer.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in the direction perpendicular to the first direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 25 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Civil Engineer, and replace them with compacted special backfill material.
4. Authorized additional excavation and replacement material shall be paid for according to Contract provisions.

3.6 TOPSOIL SPREADING

A. Topsoil shall be stripped and stockpiled as described in Section 31 10 00. After the proposed grading has been completed, the Contractor shall spread the stockpiled topsoil on the areas to be seeded.

B. A minimum 6-inch thickness of topsoil shall be spread uniformly over the disturbed areas to be seeded as described in Iowa DOT Section 2105.03(B).

3.7 FINISH GRADING AND SHOULDERING

A. The Contractor shall uniformly grade grassed areas to a smooth surface, free of irregular surface changes. The Contractor shall comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Where shouldering is required, the shoulder finishing shall be as described in Iowa DOT Section 2123. Topsoil shall be used for the shoulders. The military parking lot or pavement surface shall be kept clean of misplaced shoulder material.

END OF SECTION

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SECTION 32 10 00

BASES, BALLASTS, AND PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. The work covered by this Section includes the granular subbase, granular surfacing, Portland cement concrete, and pavement markings.

B. The locations, grades, reinforcing details, and other details of construction are shown on the drawings and described in the specifications. All slabs shall be formed so the finished surface drains.

C. Except as otherwise noted herein, materials and workmanship shall meet the requirements of Sections 2115, 2301, and 2512 of the Iowa DOT Specifications.

1.2 SUBMITTALS

A. Shop Drawings: none required.

B. Product Data:

1. Material Certifications:
   a. Concrete mix design.
   b. Coarse aggregate quality and gradation for concrete.
   c. Fine aggregate quality and gradation for concrete.
   d. Cement.
   e. Air-entraining agent.
   f. Water reducer.
   g. Fly-ash.
   h. Reinforcing steel.
   i. Modified Subbase Material.
   j. Granular Surfacing Material.
2. Catalog Information:
   a. Foam for expansion joints.
   b. Dowel bars.
   c. Curing compound.
   d. Joint sealant.
   e. Preformed joint materials.
   f. Chairs for reinforcing steel.
   g. Engineering fabric.
   h. Pavement marking materials (paint and reflectorizing spheres).

PART 2 - PRODUCTS

2.1 GRANULAR MATERIALS

A. Modified subbase shall meet the requirements of Iowa DOT Section 4123.

B. Granular surfacing material shall be Class A crushed stone, meeting the requirements of Iowa DOT Section 4120.04 or granular material salvaged from the existing parking areas.

2.2 PAVEMENT TESTING

A. Prior to the selection of the mix design, the Contractor shall, at their own expense, provide test results and other evidence to show the proposed materials' sources are capable of producing materials that meet the specifications. If the source of the material produces more than one

grade of material, the Contractor shall indicate how they intend to make sure the correct grade of material will be delivered to this project. If extraordinary inspection measures are required to exclude unsuitable materials from the project, such inspection shall be at the cost of the Contractor.

B. Concrete test cylinders shall be used to monitor the strength of the concrete being placed on this project. Four cylinders shall be taken from approximately each full-day pour on mainline paving. If a full-day pour exceeds 500 S.Y. of paving, a new set of cylinders shall be cast for every 500 S.Y. The Owner will hire an independent testing company to make, cure, and test the cylinders.

C. For each pour of concrete (more than 5 cubic yards), the testing company shall test the wet concrete for air and slump. If there are 100 or more cubic yards of concrete placed in one day, additional air and slump tests shall be taken at the same time additional concrete test cylinders are cast.

2.3 **PROPORTIONS FOR CONCRETE MIXES**

A. Any Class C mix, as specified in Iowa DOT Section 2301.02, shall be used for the concrete covered by this Section.

B. The water-cement ratio, entrained air content, and slump shall be as specified in Iowa DOT Specifications Section 2301.02(B). The slump shall not exceed 4 inches for hand-finished concrete.

C. Class 3 durability aggregates shall be used on this project. The aggregate shall not contain more than 1% chert.

D. The Iowa DOT restrictions on the use of fly ash and furnace slag shall apply to concrete used on this project.

E. The Contractor may use Class M concrete for their convenience at no additional cost to the Owner.

2.4 **MISCELLANEOUS MATERIALS**

A. Except as otherwise specified herein, all materials used shall meet the requirements for the respective items in Division 41 of the Iowa DOT Specifications.

B. The reinforcing steel shall be Grade 60 steel deformed bars. Epoxy coating is not required. The steel shall be placed in accordance with Iowa DOT Section 2301.03(E). Plastic chairs shall be used to hold the steel at the depth shown on the drawings.

C. The curing compound shall be a white-pigmented liquid curing compound as described in Iowa DOT Section 4105.

D. Foam for expansion joints shall be equipped with a removable strip to ensure the sealant is filled to the proper depth. The expansion foam shall be Expansion Strips by Reflectix, Cellu-Cushion EXP 200 by Sealed Air, or 1000 Series Expansion Board Caps by BoMetals, Inc. The joint sealant shall meet the requirements of Iowa DOT Section 4136.

E. Sealant for contraction joints shall meet the requirements of Iowa DOT Section 4136.

F. Geotextile under granular surfacing shall meet the requirements of Iowa DOT Section 4196.01(B)3.

G. Traffic paint shall be yellow in color and meet the requirements of Iowa DOT Section 4183. Reflectorizing spheres shall meet the requirements of Iowa DOT Section 4184.

PART 3 - EXECUTION

3.1 **MODIFIED SUBBASE**

A. All the paved areas shall receive modified subbase material. The subgrade for all paved areas shall be prepared as described in Section 31 20 00 prior to placing the modified subbase.

B. The modified subbase material shall be constructed to the cross section and grades as shown on the drawings. The modified subbase shall be placed in the locations as shown on the drawings and in accordance with Iowa DOT Section 2115.

C. The modified subbase shall be placed in two 4-inch lifts and compacted after each lift.

D. Compaction of the moistened granular subbase material shall be accomplished with a vibratory-steel drum roller in accordance with Iowa DOT Section 2001.05(B), if space allows. If the area is too small, a walk-behind vibratory plate compactor shall be used. A minimum of three passes per lift shall be made over the modified subbase material.

3.2 GRANULAR SURFACING

A. Granular surfacing shall be placed in the locations shown on the drawings and as described herein.

B. Prior to placing the granular surfacing, geotextile shall be placed on the prepared subgrade. Where laps in the geotextile are required, the minimum lap width shall be 1 foot. Laps shall be stapled and arranged such that the uphill piece of fabric is on top.

C. The granular material shall meet the requirements of Section 32 10 00(2.1) and shall be placed and compacted as described for the modified subbase in Section 32 10 00(3.1). Salvaged granular material shall be used before new road stone is brought onsite.

3.3 CONSTRUCTION OF PCC PAVEMENT

A. The work covered by this Section includes the Portland cement concrete paving. In areas where the curb and gutter are shown, the curb and gutter shall be cast integrally with the rest of the slab. The concrete shall be placed using conventional forms and a power screed or using a slipform paver as described in Iowa DOT Section 2301.03(A).

B. Except as otherwise specified herein, materials and workmanship shall conform with the applicable portions of Iowa DOT Sections 2301 and 2512. All concrete shall be consolidated with mechanical vibrators as described in Iowa DOT Section 2301.03(A)3.

C. Finishing of the pavement surface shall comply with Iowa DOT Section 2301.03H. Macrotexture shall not be required or allowed.

D. Final pavement smoothness shall comply with the requirements of Iowa DOT Section 2301.03(H)4. The Contractor shall be required to straightedge the entire surface of the new pavement while it is still plastic, with a straightedge that is at least 10 feet in length. Iowa DOT Section 2316 shall not apply.

E. Curing and protection of the pavement shall be in accordance with Iowa DOT Section 2301.03K.

F. Joints shall be constructed by the Contractor as shown on the drawings and on Iowa DOT Standard Road Plan PV-101. Joint sealant shall meet the requirements of Section 32 10 00 (2.4). Contraction joint layout for parking areas and returns shall be marked in the field by the Contractor's personnel and reviewed by the Owner prior to sawing.

G. Curb and gutter shall be constructed in accordance with Iowa DOT Section 2512. The finished surface shall conform to the lines and grades shown in the drawings. The concrete surfaces and gutters shall drain and have no depressions which trap water. Areas that trap water shall be corrected by grinding or removal and replacement of concrete panels prior to acceptance.

3.4 PAVEMENT OPENING TIME

A. This Section covers the curing time for all pavement in the project. The Contractor shall stage their work to minimize the amount of construction traffic driving on the newly-poured concrete (even if it has reached strength).

B. The time needed to open the pavement will be determined by the minimum age and compressive test results needed for opening it. In lieu of making cylinders, the Contractor may elect to use a maturity meter to monitor the strength of the concrete as described in IDOT Section

2301.03(U) and IDOT Materials I.M. 383. The pavement (Class C mix) shall remain closed and opened only as described below:

1. If the maturity method is not used, the pavement shall be kept closed to all traffic for 7 calendar days and obtain a minimum compressive strength test result of 3,000 psi.
2. The pavement may be opened to a light pickup pulling a tar kettle if the maturity testing shows adequate strength and the pavement has been in place for at least 84 hours.
3. The pavement may be opened to other vehicles if the maturity testing shows adequate strength, the pavement has been in place for at least 108 hours, and the joints have been sealed.

3.5 BACKFILL AND CLEANUP

A. Grading adjacent to the pavement shall blend in smoothly with the existing ground and shall provide adequate drainage. Areas shall be shaped to drain.

B. All culverts, storm sewer, intakes, tile intakes, tile, and manholes shall be kept clean and free draining.

C. Prior to the final inspection, all foreign material shall be removed from the pavement and storm sewers.

3.6 PAVEMENT MARKINGS

A. Pavement markings shall be as shown on the drawings and as described herein.

B. The pavement markings shall be placed in accordance with Iowa DOT Section 2527.03.

END OF SECTION

SECTION 32 31 00

CHAIN LINK FENCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Concrete post bases.

C. The fence fabric shall be salvaged and reinstalled from the fence removed to facilitate the construction as shown on the drawings.

1.2 QUALITY ASSURANCE

A. Materials and construction are to be in accordance with United States Army Corps of Engineers (USACE) STD 872-90 Series - Standard Details for Chain Link Security Fencing, FE6 Type Fence or as specified or detailed, whichever is more stringent, for materials, finishes, and installation.

B. Fencing shall meet or exceed minimum standards established by the Chain Link Fence Manufacturers Institute (CLFMI) Product manual or as specified or detailed, whichever is more stringent, for materials, finishes, and installation.

C. Manufacturer Qualifications:

1. Company specializing in manufacturing the products specified in this section with a minimum of five years of experience.

2. Obtain chain link fences, including accessories, fittings, and fastenings as complete units from a single source.

D. Installer Qualifications:

1. Perform installation with experienced fence erectors with a minimum of five years of experience under the supervision of a factory-authorized representative.

1.3 SUBMITTALS

A. Shop drawings: Indicate layout, spacing of components and post foundation dimensions, hardware anchorage, and schedule of components.

B. Product Data: Provide data on finishes, fabric, posts, accessories, fittings, and hardware.

C. Submit the manufacturer's technical data and installation instructions for the chain link fencing.

1.4 WARRANTY

A. None.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Acceptable Fence Manufacturers:

1. Anchor Fence Company, Inc.
2. Anchor Die Cast, Inc.
3. Master Halco
4. The Tymetal Corporation
5. Approved equal

2.2 MATERIALS

A. Fence Height:

1. 6'-0" to top of mesh. 1'-0" barbed wire top guard shall be in addition to this height (see plans for locations to receive barb wire).

B. All new materials; used, re-rolled, re-galvanized, or open seam posts or rails are not acceptable.

C. Posts, braces, rails, tension bars, truss rods, and tension wire shall be steel. Post tops, barbed wire supporting arms, tension bar bands, and other parts shall be of steel or iron, except that post tops, rail ends, ties, and clips may be aluminum.

2.3 COMPONENTS:

A. Fabric:

1. 9-gauge (min.) steel wire woven in a 2-inch diamond mesh, one piece fabric width.
2. Minimum breaking strength: 1,290 lb/f.
3. Top and bottom selvages twisted and barbed.
4. Finish:
   a. Galvanized after weaving by hot-dip process to give a minimum of 1.2 oz. of zinc/sq. ft. of wire surface distributed over the entire fabric, including cut ends, in accordance with ASTM A392 Class 1.

B. Framework:

1. Steel Pipe – Type I: ASTM F -1083, standard weight (Schedule 40) galvanized pipe; sizes as indicated. Hot-dip galvanized with minimum average zinc coating of 1.8 oz./ft.^{2}. Sizes as indicated.
2. Steel Pipe – Type II: Steel pipe cold-formed and welded per ASTM F-1043, Group 1C or Group 4, having a minimum yield strength of 50,000 psi. The external zinc coating shall be Type B, zinc with polymer film, 0.90 oz./ft.^{2} minimum zinc coating with a chromate conversion and a verifiable polymer film. The internal coating shall be Type B, zinc 0.90 oz./ft.^{2} minimum or Type D, zinc pigmented, 81% nominal coating with 0.30 mils minimum thickness. Sizes as indicated.
3. Framework Sizes:

Description		Nominal Outside Diameter	Nominal Weight Per Foot (Lbs/Ft)	
			Type I	Type II
End, corner, and pull posts:		2.875"	5.79	4.64
Rails and post braces:		1.66"	2.27	1.83
Intermediate (Line) posts:		2.375"	3.65	3.12
Swinging:	Up to 6' wide:	2.875"		4.64
	Over 6' to 12'	4.000"		8.65
	Over 12' to 18'	6.625"		18.02
	Over 18' to 24'	8.625"		27.12
Sliding:	All widths	4.000"		8.65

C. Accessories

1. Post Tops: Pressed steel, cast iron, or cast aluminum alloy ornamental tops or combination

tops with barbed wire supporting arms, as required. The post tops shall fit over the outside of the posts and shall exclude moisture from the posts.

2. Rail and Brace Ends: Pressed steel, cast iron, or cast aluminum alloy, cup-shaped to receive rail and brace ends.
3. Tension (Stretcher) Bars: Steel strip, Minimum 3/4" wide x 3/16" thick and not less than 2" shorter than fabric height. Provide one tension bar for each end and two for each corner and pull post.
4. Tension (Stretcher) Bar Bands: Pressed steel, minimum 300-degree profile curvature for secure fence post attachment
5. Truss Rods: Steel rod, galvanized, 3/8" diameter merchant quality with turnbuckle.
6. Tension Wire: Marcelled 7-gauge steel wire with a minimum coating of 0.80 ounces of zinc or 0.40 ounces of aluminum per square foot of wire surface and conforming to ASTM A 824.
7. Wire Ties:
    a. Fabric to Intermediate (Line) Posts, Rails, and Braces: 9-gauge galvanized steel wire, single strand.
    b. Fabric to Tension Wires: 12½-gauge galvanized hog ring ties.
8. Barbed Wire Supporting Arms: Pressed steel, cast iron, or cast aluminum alloy fitted with clips or other means for attaching three strands of barbed wire. Arms shall be set outward at an angle of 45 degrees and shall be capable of supporting a 250-lb load at the outer barbed wire connecting point without causing permanent deflection. The top wire shall be approximately 12" horizontally from the fence line, and the other wires should be spaced uniformly between the top of the fence fabric and the outside strand.
9. Barbed Wire: 12½-gauge, two-strand twisted line wire with 4-point barbs at 5" spacing. Coating shall consist of a minimum of 0.809 ounces of zinc per square foot of wire surface conforming to ASTM A 121, chain link fence grade.
10. Finishes:
    a. Unless noted otherwise, all iron and steel components, except wire and framework; hot-dip galvanized after fabrication to produce an average minimum zinc coating weight of 1.2 oz. per square foot of surface.

D. Concrete Mix:

1. ASTM C94 Portland Cement concrete with a maximum ¾" aggregate having a minimum compressive strength of 3,000-psi at 28 days.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation to conform to ASTM F-567.

B. Wire ties, rails, posts, and braces shall be constructed on the secure side of the fence. Fabric shall be placed on the opposite (non-secure) side of the fence.

C. Fence installer to verify underground utility locations or other obstructions prior to fence installation.

D. Post Spacing: Space line posts at intervals not exceeding ten feet.

E. Terminal posts (end and corner) shall be set at the beginning and end of each continuous length of the fence and at abrupt changes in vertical and horizontal alignments (30 degrees or

more).

F. Post Setting: Set terminal and line posts plumb in concrete footings. Footings to be:

1. 12" (min.) diameter for intermediate (line) posts.
2. 16" (min.) diameter for end and corner posts.

G. Bottom of footings to be:

1. 42" (min.) below grade for 4" OD posts.
2. 46" (min.) for 6 5/8" OD posts.
3. 52" (min.) for 8 5/8" OD posts.

H. Set the bottom of posts 6" above the bottom of the footings. Trowel the top of the footings with a 1" (min.) to 2" (max.) crown to direct water away from posts. Top of the crown to be 2" above grade. Footing to be uniform size full depth without flair at the top of the grade to prevent frost heave. Drill holes in firm, undisturbed, or compacted soil. Place concrete around posts in a continuous pour and vibrate or tamp concrete around posts. Check each post for vertical and top alignment and hold in position during concrete placement.

I. Bracing: Brace terminal posts back to adjacent line posts with horizontal brace rails at mid-height of fabric and diagonal truss rods. Brace line posts every 90 feet.

J. Where the fence turns a corner or bends in excess of 30 degrees horizontally or vertically, provide a corner post complete with bracing.

K. Tension Wires: Stretch from end to end of each stretch of fence. Fasten to the outside of line posts with tie wires. Attach to fabric with hog rings at 24" O.C. The tension wire shall be taut and free of sag:

1. Top Tension Wire: Install within the top 6" of the fabric.
2. Bottom Tension Wire: Install within the bottom 6" of the fabric.

L. Fabric: Pull the fabric taut with the bottom salvage 2" (+/- 1/2") above grade. Anchor fabric to the framework so that the fabric remains in tension after the pulling force is released. Fasten to terminal posts with tension bars threaded through the mesh and secured with tension bands at maximum 15" intervals. Tie to line posts with tie wires spaced at a maximum 15" O.C and within 4" from the top and bottom of the fabric. Attach to top and bottom tension wires with hog rings at a maximum of 24" intervals. Allow a minimum 24 hours after post setting.

M. Wire Ties: Use "U"-shaped wire, conforming to the diameter of the pipe to which attached, clasping pipe and fabric firmly with both ends twisted at least two (2) full turns. Bend the wire to minimize hazards to persons or clothing.

N. Barbed Wire: Anchor to terminal extension arms, pull taut and firmly install in slots of line post extension arms. Provide a retainer to prevent the removal of barbed wire from arms. Permanently attach extension arms to post tops to prevent removal.

O. Fasteners: Install nuts for fittings, bands, and hardware bolts on the inside of the fence. Peen ends of bolts or score threads to prevent the removal of nuts.

P. Completed security fence shall not have openings or clearances greater than those specified or detailed (or not greater than 6 inches, whichever is more restrictive) either through or under the fencing.

Q. Thoroughly clean up all excess materials and debris from erection operations.

END OF SECTION 32 31 00

SECTION 32 90 00

SEEDING AND EROSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers seeding, fertilizing, mulching, and cleanup for the project.

B. The materials and workmanship shall meet the requirements of Iowa DOT Section 2601 and as modified herein.

C. It shall be the Contractor's responsibility to reestablish a grass cover on all grassed areas that were disturbed during the course of construction or will not be surfaced with concrete or granular material. If the seeding does not grow uniformly or is not as dense and lush as the adjacent grassed areas, the Contractor shall be responsible for reseeding, fertilizing, and mulching until the disturbed areas are restored to equal or better condition than the adjacent areas. No additional payment will be made for reseeding.

1.2 SUBMITTALS

A. Shop Drawings: None required.

B. Product Data:

1. Material Certifications:
   a. Seed mixture (temporary, urban)
   b. Mulching
   c. Fertilizer
2. Catalog Information: None required.

PART 2 - PRODUCTS

2.1 TEMPORARY SEED

A. Seed mixture and application rates shall be as shown in Iowa DOT Table 2601.03-1 and material requirements of Iowa DOT Section 4169.

2.2 MULCH

A. Mulch shall meet the requirements of Iowa DOT Section 2601.03(E) and the material requirements of Iowa DOT Section 4169.07. Either conventional straw or hydraulic mulching is acceptable.

2.3 PERMANENT SEEDING AND FERTILIZER

A. Permanent grass seed and fertilizer shall be an urban seed mix as described in Iowa DOT Table 2601.03-4 and material requirements of Iowa DOT Section 4169.

PART 3 - EXECUTION

3.1 TEMPORARY SEEDING

A. If work is partially completed in an area and no work will be done within that area for 21 days, the area shall be seeded, seeded and mulched, or mulched as determined by the Owner. If the area is being seeded, the seed mixture shall be as specified in Section 32 90 00(2.1). The seedbed preparation and seeding shall be as described for rural stabilizing crops in Iowa DOT Section 2601.03(C)1. No fertilizer shall be applied.

B. If the area is being mulched, the mulch shall be as described in Section 32 90 00(2.2).

3.2 MULCHING AND RECP

A. Mulch, as described in Section 32 90 00(2.2), shall be applied in accordance with Iowa DOT Section 2601.03(E). Either conventional straw or hydraulic mulch is acceptable.

B. In lieu of mulch, as described in Section 32 90 00(2.2), the Contractor may elect to use salvaged chipped wood from onsite clearing and grubbing. Chipped wood mulch shall be used only for temporary stabilization of the grade. Chipped wood mulch shall not be used to stabilize a permanently seeded area.

C. The chipped wood mulch shall be a mixture of shredded bark and wood containing no more than 50% wood chips. The chipped wood mulch shall be reasonably free from leaves, twigs, dust, and other foreign material and not be excessively wet or decomposed.

3.3 URBAN SEEDING AND FERTILIZING

A. The permanent seeding shall be an urban seed mixture as described in Section 32 90 00(2.3). The seedbed, seeding, and fertilizer shall be completed in accordance with Iowa DOT Section 2601.03(C)4. Mulch shall be applied as described in Section 32 90 00(3.2).

B. The seeding shall be completed between August 10 and September 30; as a dormant seeding between November 15 and freeze-up; or between March 1 and May 31.

C. Dormant seeding shall be completed as described herein. The seeding shall be completed when the air temperatures are consistently below 40°F and prior to December 25 of a given year. Dormant seeding is not allowed on snow.

1. Prepare the seedbed before the ground freezes.
2. To ensure the protection of the seed, apply on a frosty morning or before predicted snow.
3. Seeding may be done by hand or with seeding equipment.
4. For hydraulic seeding, apply the fertilizer at no more than 0.5 pounds of nitrogen per 1,000 square feet, followed by the seed.

3.4 CLEANUP

A. All culverts, storm sewers, intakes, streets, gutters, and manholes shall be kept free of debris and soil from the Contractor’s operations.

B. Prior to final inspection, all foreign material and debris shall be removed from the pavement surfaces, military parking lot, seeded area, other areas of construction, and places where construction staging and storage of materials occurred.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. The work covered by this section includes the construction of subdrains, storm sewer, storm sewer structures, testing, and all other work and materials necessary to complete the improvements as shown on the drawings and as described herein.

B. The general location of the proposed improvements is shown on the drawings.

C. Except as otherwise noted herein, materials and workmanship shall meet the requirements of Iowa DOT Sections 2502, 2503, 2552, and 2435.

D. The project site is very flat. Providing adequate drainage to the site is critical to a successful project. The Contractor shall take extra care to ensure the storm sewer is constructed at the grades and elevations shown on the drawings.

1.2 SUBMITTALS

A. Product Data:

1. Material Certifications
   a. Granular bedding and backfill material
   b. Porous backfill material
   c. Trench stabilization material
2. Catalog Information:
   a. HDPE sewer pipe
   b. HDPE subdrain pipe
   c. Tracer wire and warning ribbon
   d. Hickenbottom intakes

PART 2 - PRODUCTS

2.1 PIPE AND RELATED MATERIALS

A. Perforated polyethylene tubing for subdrains shall meet AASTHO M252 as described for longitudinal subdrains in Iowa DOT Section 4143.01(B). Subdrain outlets shall be Iowa DOT DR-303 outlets constructed of solid pipe meeting the requirements of Iowa DOT Section 4143.01(B)2.

B. Non-perforated polyethylene tubing for roof drains shall be Type S (dual wall) meeting the requirements of AASHTO M252 as described in Iowa DOT Section 4143.01(B).

C. The roof drain connection piping shall be corrugated polyethylene and also polyvinyl chloride (PVC) pipe as detailed on the drawings. The corrugated polyethylene shall meet the requirements of Iowa DOT Section 4143, non-perforated. The PVC pipe, including cleanouts, shall be SDR 35 solvent-weld pipe meeting the requirements of ASTM D 3034 and D 2729. All joints shall be silt tight.

D. Tracer wire shall be solid, AWG #12, blue insulated, direct bury, Type TWHN wire. Underground splice kits shall be Scotchcast splicing kits, 3M Company, or equivalent.

E. Warning tape for the roof drain sewer pipe shall be green in color with black lettering stating: “Caution, Buried Sewer Line Below.” The tape shall be 6-inch wide by 3.5 mils thick plastic tape designed for direct burial. The warning tape shall have an aluminum core so it may be located with non-ferric metal detectors.

2.3 INTAKES

A. The 8-inch HDPE riser intakes shall be HDPE, orange in color, as manufactured by Hickenbotom, Inc., or equivalent.

2.4 BEDDING AND BACKFILL MATERIAL

A. Porous backfill for subdrain and roof drain pipe shall meet the requirements of Iowa DOT Section 4131.

B. Granular material for trench stabilization shall be 2½-inch crushed stone meeting the requirements of Iowa DOT Section 2552.02(F) or granular surfacing material salvaged from the existing parking area.

C. Sand for encasement of plastic utility lines shall be a Class II backfill material conforming to Iowa DOT Section 2552.02(D). The sand shall be poorly graded with 100% of the material passing the #4 sieve.

PART 3 - EXECUTION

3.1 EXPLORATORY WORK AND REMOVALS

A. Prior to beginning construction of the roof drains or subgrade preparation, the Contractor shall locate existing utility lines as shown on the drawings to allow possible modifications in the design. The locating work shall be completed prior to ordering structures and pipe.

3.2 CONSTRUCTION

A. Subdrains and roof drain pipe shall be trenched, installed, backfilled, and compacted as described for longitudinal subdrains in Iowa DOT Section 2502.

B. All pipe (except subdrain) shall be provided with tracer wire and ribbon. Tracer wire shall be taped to the top of the pipe with at least one piece of tape per stick of pipe.

3.3 BACKFILL AND COMPACTION

A. Backfill and compaction of the storm sewer trenches shall be as described in Iowa DOT Section 2502 and as modified herein.

B. Where proposed storm sewers cross under any existing underground utility, the trench shall be backfilled with granular material. The granular backfill shall be placed 3 feet on each side of the crossing and shall fill the area between the proposed pipe and the utility. The granular backfill shall meet the requirements of Section 33 40 00(2.4) and be compacted to 65% of relative density. Plastic water main and plastic, plastic-coated gas main, and plastic electrical and communications utilities shall be protected from the granular backfill material by encasing them with sand as described in Section 33 40 00(2.4).

3.4 UNSTABLE SUBGRADE

A. Crushed stone meeting the requirements of Section 33 40 00(2.4) shall be used to replace unstable trench subgrade in accordance with Iowa DOT Section 2552.03. Subgrade stabilization material shall not be used without prior review by the Owner.

B. Payment for the replacement of the unstable subgrade shall be made by change order.

3.5 REPAIR OF EXISTING DRAINS

A. Trenches for the proposed storm sewer may intersect existing drains. When such conduits are encountered, the Contractor shall inform the Owner before making any repairs.

3.6 TRACER WIRE AND WARNING TAPE

A. All roof drain pipe shall be provided with tracer wire and warning tape.

B. The tracer wire shall meet the requirements of Section 33 40 00 (2.1) and be installed as described in Iowa DOT Section 2554.03(A)6.

C. The use of underground splices shall be minimized. Where underground splices are required, they shall be as described in Section 33 40 00 (2.1).

D. After all utilities have been installed but prior to substantial completion, the Contractor shall demonstrate, in the presence of the Owner, the continuity of all tracer wires from end to end at all underground utilities. Tracer wires that fail a continuity test shall be repaired or replaced and re-tested until a successful continuity test is achieved. Provide the Owner a 48-hour notice of this activity.

E. The warning tape shall be installed as shown on the drawings and as described herein. The warning tapes shall be as described in Section 33 40 00 (2.1). The Contractor shall take care when backfilling over the tape to prevent the tape from being ripped. The warning tape shall be installed in the same locations as the tracer wire.

F. Tracer wire stations shall be installed as shown on the drawings.

END OF SECTION

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